A case by case study of 20 successful mixed farming enterprises in the South Australian Mallee

STRATEGIC PRACTICAL OPTIONS FOR
INTEGRATING CROPPING AND LIVESTOCK SYSTEMS
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## Glossary

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Strategic Practical Options for Integrating Cropping and Livestock Systems: Successful Farmer Case Studies

Introduction

The “Implementing Sustainable and Productive Forage Systems in the Murray Mallee” project has been funded by Caring For Our Country from 2008 to 2009 to develop a publication of farmer case studies illustrating different ways cropping and livestock can be successfully integrated. The project has been delivered by Rural Solutions SA on behalf of the Mallee Sustainable Farming Inc.

With the run of drier seasons, and in particular dry springs and less growing season rainfall, the region is on an ongoing journey of exploration to find new ways to manage the integration of the crop and livestock systems. Successful integration rests on the ability to reduce compromises and competition of the two enterprises.

30-60% of low rainfall Mallee farmers still practice a self-regenerating pasture/crop system as the advantage has been low input costs resulting in reduced financial risk. On the other hand this can also result in low farm output and potentially lower returns.

The self-regenerating pasture/crop system evolved because historically it was the best fit for machinery size, tillage practices, grain handling, finance, attitude to risk and labour shortage. Sowing and harvesting of the whole farm in one season was not an option and returns from livestock meat and wool were at an all time high.

This system allowed farmers to evenly spread labour demand over 12 months, minimise machinery capital and maintain profitability until the decrease of wool prices, and increase in livestock input costs from supplementary feeding during a prolonged run of dry years.

More recently cropping has proved to be a competitive enterprise in terms of returns, albeit with higher risk. Many farm businesses have invested in new cropping technology (e.g. no-till) and as a result have greater pressure to sow more hectares to manage the cost of machinery depreciation. The adoption of no-till has also increased yield reliability in dry seasons allowing for timely sowing and greater areas of a farm to be sown each year.

Of concern in a livestock/crop system is the lack of feed and increased risk of overgrazing and subsequent wind erosion. This has partly been managed by a shift to sheep meat or cattle production, which reduces summer livestock numbers. Other strategies include the use of confinement areas for finishing livestock or containing breeding stock and above all the production of more feed from sowing cereals for grazing or opportunistic hay or harvest.

Farmers have learnt how to grow more feed with grazing crops that have shown the potential to be complimentary to the cropping enterprise if the right species are used to control root diseases and allow effective weed control. Grazed crops can be utilised as a crop, a pasture, or in above average rainfall years both, pasture and crop.

The challenge now is to build more profitable systems with productive and responsive livestock, that capture the value of extra feed at its highest quality and turn it into more kilograms of livestock product (i.e. wool, lamb, beef) per winter grazed hectare. The cost of sowing the feed is then easily covered and the livestock enterprise further adds to farm gross income.
The focus is shifting to per hectare livestock production and attention to the key drivers – stocking rate, reproduction rate and turn-off weight of meat or fibre. These systems must be more labour efficient and not compete for labour during busy cropping periods. They must also manage the environmental aspects to achieve sustainability.

Learning from others
As no two farm businesses are the same it is difficult to develop set guidelines or rules to manage a crop and pasture system. What is recognized is that sharing successful farmer developed strategies with other farmers has long been a critical success factor to overcoming management issues and has driven the progression of modern farming techniques.

All farmers across the Mallee have long been coming up with ways to overcome challenges that arise within cropping and livestock systems. Some of these issues may include:

- managing feed gaps
- maintaining soil cover all year around
- maintaining good medic pastures
- managing no-till and pastures
- managing the cost of machinery depreciation on reduced crop areas
- controlling certain weeds in crops or pastures
- managing the effect of residual herbicides
- managing permanent pasture
- strategic confinement feeding and livestock finishing
- less labour intensive paddock feeding systems
- more efficient grazing management systems
- restructure or redesign of property infrastructure – fences & water.

The 20 case studies in this publication examine different farmer approaches and experiences on what has and hasn’t worked for mixed farming systems across the Mallee. They also demonstrate the diversity in farming approach and provide an insight into how others manage certain issues within their system.

Three of the case studies also include feed demand calculations based on MLA feed demand calculator output. This electronic tool can be used to help producers better match feed demand to feed supply, to enable better feed utilisation.

It’s important to remember that there is no one right method, and what works for one farmer may not work for the next.

We hope you find these case studies thought provoking, and that they challenge you to investigate new ideas and implement something new into your own farming system. We encourage you to take what you need or what you think will work from other’s experiences and modify strategies to suit your individual system.
Minimising the Risks

Case Study One - Peter & Lia Blacket
Interviewed by: Mehdi Zaboli

Background

Peter and Lia Blacket with help of farm hand Barry May, run their mixed farm enterprise west of Wynarka. Peter is a third generation farmer.

Their total 4180ha consists of sandy, loamy and stony soils. 280 ha are non-arable and used exclusively for grazing. Based on income and land usage 60% of the Blacket’s enterprise is cropping and 40% is livestock.

Livestock are a big part of their business and Peter believes they help clean out his cropping paddocks and save on chemical costs.

Aside from the main business, Lia Blacket is also a well known breeder of riding ponies. This side enterprise attracts overseas agricultural science students to their farm for working holiday opportunities.

Peter believes the keys to his success include his adoption of new practices such as no-till and grass removal; calculating cost of production; and learning from others. Having a mix of livestock and cropping also provides income diversity and risk management.

Peter wants to have a more profitable enterprise in the next 10 years and possibly expand his farm size by 20%. He is also planning to increase his off-farm investment.

Cropping

Of the cropping paddocks, 45% are sandy, 40% are stony and 15% have loamy areas. A pasture/ cereal rotation is run on 70% of the cropped area, with the remaining 30% continuously cropped with canola, wheat, wheat or lupins, wheat, wheat.

In preparation for cropping, summer weeds are controlled with herbicides and grazing. Peter normally starts his summer weed control 4-5 weeks after summer rain with a mixture of glyphosate and LV Ester 680® (2,4-D ester) plus Garlon® (triclopyr) for melon control. Grazing helps to save on chemical costs and provides feed for stock. Summer weeds are controlled to conserve moisture and reduce trash for sowing.

In the pasture phase, Peter aims for 85% grass removal with a grass selective herbicide in June or July, even in dry years. Additional grass control is achieved through spray-topping all pasture paddocks in spring. There is a strong emphasis on not having more than 15% grass in a pasture the year before crop. The cost of winter cleaning is relatively low and well worth the investment. Broadleaf weeds are controlled in medic pastures using the spray-graze technique with low rates of MCPA.

Peter Blacket in front of his Flexi Coil Air-seeder

At a Glance

Location: Wynarka
Total Area: 4180 ha
Annual Rainfall: 340 mm
April-Oct Rainfall: 235 mm
Main focus of enterprise: 60% Cropping
40% Livestock
Sulfonyl urea herbicides are used in every second cereal crop to keep the weed population low. A pre-seeding knockdown spray is also used. Cultivation is only utilised in patches of paddocks where woody weeds such as horehound and onion weed are a problem.

Crops are sown using a Flexicoil air-seeder with Atom Jet narrow points, press wheels, and a single shoot system on 9 inch (23 cm) row spacing. 85% of crops are sown using no-till and 15% are minimum tilled (one cultivation and then sow).

Frost is a common problem and Peter believes they had 10 frosts in the critical flowering period in 2007. Grain oats are sown on the most frost prone paddocks that also tend to be sown last. Triticale is not grown any more due to its susceptibility to frost, and if canola gets frosted it is cut for hay.

Other cropping problems include variability in weather and dry springs, costs of machinery replacement, and no reliable profitable break crop. Canola is used as a break crop but the returns tend to be low for the high input requirement. This makes it a high-risk crop.

**Livestock**

The Blackets run 3660 sheep which consists of 1900 self replacing merino ewes up to 6.5 years, 880 ewe hoggets, 800 wether hoggets, and 80 home bred rams. Ewes are run in mobs of 350 and hoggets in mobs greater than 800 sheep. They also have a breeding herd of 80 cows and 75 calves.

Shearing takes place in August for ewes, hoggets, rams and in November for lambs. Lambing takes place in April/May (mainly May) but this will be moved to May/June in 2010 as Peter believes this might reduce feed costs.

Cattle calve in February/March and also in July/August. Progeny are sold at a target weight 380-420 kg at 15 months of age.

Throughout the year stock graze around 1800 ha of regenerating medic pasture; 360 ha sown cereals or a cereal vetch mix; 280 ha of non-arable land; and 140 ha of lucerne. Sowing rye for pasture following a cash cereal crop is another option that is currently being explored.

Over 2000 ha of stubble is utilised over summer and autumn. 100 tonnes of hay and 550 round bales of hay are used for hand feeding and in some seasons Peter utilises agistment at Naracoorte in the South East of SA.

Cattle are preferentially grazed on sandy paddocks and the sheep on paddocks with heavier soil. Peter does not overgraze paddocks for fear of erosion.

Peter is planning to explore strip or controlled grazing methods in the near future and wants to make more income from Merinos. He is also in the process of developing a confinement feeding area for drought and production feeding. Livestock will be put into confinement when there is late break to minimise erosion and this will enable maintenance of a higher stocking rate. Stoking rates, along with fibre diameter are important drivers of profit in his merino enterprise.

Blacket’s sown cereals and non-arable paddocks provide early feed for stock, whilst other feed sources are grazed in late autumn and winter. Oats and vetch are Peter’s favourite sown feed and he will try cereal rye this year as others in the Mallee are getting good results. Feed paddocks are usually sown between ANZAC day (April 25th) and the first week of May to supply feed around mid to late June. If there is a late break feed is sown dry. Feed is sown with 30 kg/ha DAP.

The 140 ha of lucerne is fertilised annually with 50 kg/ha DAP. It is rotationally grazed between spring and autumn, depending on rainfall.

The merino wether lambs are sold when they are 11-13 months old predominantly in April/May, with some sold in September off shears. Peter normally targets 30-35kg dressed weight for 11-13 month old merino lambs and 50-55 kg live weight for mature Merinos. As a demonstration of the flexibility in the sheep enterprise, wethers have been sold in the last two years due to the dry seasons.

In addition to live weight, the decision to sell stock depends on feed availability, weather outlook and price. Peter may sell stock earlier if he has limited hay and grain on hand; can not find agistment; or the opportunity cost of retaining stock is too high.
What are the strengths of this system?
Peter has been observing his changing feed supply and is considering adjusting the time of lambing to better match it and save some costs. The balanced pasture composition during the green growing phase will meet ruminant needs and reduce animal health issues of legume dominant pastures. These pastures make a significant effort to minimise cereal root disease build-up in the pasture phase. There is good natural resource protection with cattle grazing on sandy country and the livestock are an integral part of the summer weed control program.

What are the possible challenges within this system?
The feed cost of the livestock enterprise could be higher than expected as a portion of the regenerating pasture cost should be allocated to the livestock, as should the hay, grain, lucerne and grazing cereals.

The intended May lambing may clash with seeding and will require consideration of a low labour input, minimum disturbance feeding system such as “Lick Feeders.”

What could be implemented in the future?
Livestock are often a hidden, yet valuable component of the frost strategy as they can control autumn weeds in late sown crops, utilise frosted hay or down graded grain and graze low yielding, non harvested areas.

Merino lamb meat sales are an important part of the returns and as such, Merino rams should be objectively selected for fast growth rate, early maturity and heavy muscle.

Some April/May lambers, unseasonally droughtlot their pregnant ewes in February and March, saving or deferring stubble feed for the lambing ewes.

Some issues are still being explored like managing heavy stubble residues in a good season to ensure adequate bareground for good pasture germination at the break; spilt grain allowing mice to multiply more than normal; weed management; and mis-mothering if stubble is left high and dense, etc. The positive is that the ewes have adequate paddock feed on offer at lambing and hence require little supplementation and disturbance during lambing. Lambing is also complete before seeding. Alternatively, July / August lambing would suite a confinement area.

What ever the case, access to a confinement area, and plans to control graze sown cereals, will alter the timing of the quantity and quality of feed on offer and will require some modification of the livestock calendar year.
Livestock tailored to fit cropping system

Case Study Two - Allen Buckley
Interviewed by: Tim Prance

Background

Allen runs a second generation farming business about 12km south of Waikerie. The farm has an average rainfall of 250mm with 160mm falling during the growing season. Allen farms with a mix of cropping and livestock, which he considers essential given the significant area of stony soils on this farm, in a low rainfall farming area.

The farm's soils are a third each of loam, sand over loam and stony. This farm has been 100% no till for 18 years – being one of the first in the Mallee to adopt no tillage seeding. Maintaining good soil condition and ground cover, is an important part of his farming business, which is helped by his approach to managing sheep grazing and using a confinement area for sheep.

The property is 5000 ha in size, which includes 750 ha scrub and 400 ha non arable very stony country. 3850 ha is cropped each year, which includes 900 ha of less stony ground sown to triticale and cereal rye for grazing. This can be harvested depending on the season. Cereals intended for grazing are sown dry in early April.

The farm employs 3 labour units, plus another 0.75 full time equivalent of casual labour at seeding and harvest, crutching and shearing. In the future, with no immediate family members to continue farming, Allen aims to employ a manager, so he can enjoy semi-retirement.

Allen is heavily involved in community activities, including Mallee Sustainable Farming (MSF), where the main trial and demonstration site has been on his farm for the last 12 years. Allen has been able to access on farm research information conducted by CSIRO, University of Adelaide and SARDI and using agronomists has adapted systems to work on his farm.

Cropping

A typical rotation is wheat, wheat, wheat, followed by barley, barley, then oats for hay, cereal rye and canola, before going back to wheat. Using no-till has contributed to successfully cropping in a low rainfall area, allowing for moisture conservation, successful weed control and early sowing on no or minimal rainfall.

A Concord seeder is used for one pass seeding with knife points and press wheels, sowing on 12 inch (30cm) row spacings. The seeder has double shoots to keep seed and fertiliser separate. There is also a spreader on the knife points.

Allen demonstrating his Air-seeder to a few local farmers and agronomists.
to spread seed over a 10cm band within the row.

Summer weeds are knocked out early, as soon as they appear. There is a trend to using more sprays over summer compared to winter due to the short growing seasons and more significant summer rainfall events. Paddocks may be sprayed with a knockdown herbicide before sowing, but increasingly are sown with no knockdown following opening rains.

Sulfonyl urea herbicides have been used only three times in the past 18 years.

There are no serious weed problems on this farm. Allen got on top of weeds 15 years ago. Winter cleaning, spray-topping and spray grazing are not required as there are no pastures. Allen can sow three crops in succession without any need for winter weed control.

Fertiliser is applied according to crop/hay removal in the previous year and soil fertility levels. Currently 75 kg/ha 19:13 is applied to crops on sandy soils, 50 kg/ha 19:13 on loams and 20 kg/ha 19:13 on stony soils.

Cropping issues mostly concern marketing. This includes the pitfalls of forward selling and contracting and volatile grain prices. Allen tries to overcome this by storing grain and hay on farm.

Livestock

1200 Merino ewes are run with half mated to Merino rams, and half to White Suffolk and SAMM rams.

Ewes lamb in July and the lambs are weaned in November/December. Lambs are sold between December and July at between 48 kg and 60 kg live weight. Lighter lambs that haven’t been sold by December are finished in an on farm confinement area for sale in autumn to early winter.

In a poor spring, lambs are weaned earlier (around October), and cross bred lambs finished in the confinement area, whilst Merino lambs are put into 40 ha of salt bush, and supplementary fed. In this situation ewes are put into confinement in early summer.

250 Merino ewe lambs are kept as replacements, with the remainder sold for meat. Meat sheep are sold through saleyards or over hooks.

Key Messages

- A mix of cropping and livestock helps to manage risk particularly on stony soils in a low rainfall area
- No-till to sow early on no or minimal rainfall using stored moisture plus good weed management
- Don’t overcapitalise on machinery – Allen’s machinery is valued at $600,000 for no-tilling 3850ha crop every year
- Use a confinement feeding area for sheep in late summer/autumn
- Access, absorb and apply information and research available through different networks.

Grazing

No livestock are currently traded, but Allen is planning to add trading sheep to his ewe flock, once the grazing system is sorted out. Allen is confident he can increase the farm stock carrying capacity, without compromising soil cover, by using portable electric fences to more intensively manage sheep grazing in both winter and summer.

The current grazing system has ewes in 10-12 mobs of about 100 ewes each. Only ewes are grazed over summer/autumn/mid winter. They are stocked in paddocks up to 160 ha size and shifted every four to six weeks. They graze hay paddock residues, grazed cereal residues as well as stubbles. Standing crops tend to be reaped.

Water is reticulated through mains and troughs which use to be in corners of paddocks but are now being shifted to the centres of paddocks.

Late shearing in autumn means care has to be taken not to create too much dust during summer/autumn as ewes have very long wool. Maintaining stubble cover is therefore essential, and is an important result of the no-till farming system. Straw is also placed around the troughs to reduce dust.

During summer, paddocks are never eaten out. Only grain and leaf is removed by sheep. Once the stubble cover starts to disappear, ewes are moved to a confinement area.

Allen in his sheep yard
Early sown cereals provide ewes with feed, most years, from late April/May onwards. Electric fencing is used in early winter to ration green feed. Ewes are grazed on about 5 ha grazing cereals per week per mob of 100 ewes. The RAPPA portable electric fencing unit is used with three wires - one earth and two live.

Hay is cut from cereals sown for grazing, plus oats sown specifically for hay as part of the farm cropping rotation. Generally 200 big square bales of hay are cut each year (about 150 tonnes). Surplus hay can be sold in early winter, if enough paddock feed is available. Approximately 150t of grain is also stored on farm for use in the confinement feeding areas.

Livestock program issues include time and labour involved, availability of sufficient paddock feed at break of season/early winter, and profitability of livestock given breakeven cropping yield is about 0.8t/ha.

By Albert Singh - Senior Livestock Consultant
Rural Solutions SA

What are the strengths of this system?
The manager’s ability to digest information, seek out and also contribute to research findings, integrating what suits into the farming system is a huge strength in this enterprise. Allen is happy to share this knowledge and be part of its development.

There are many technologies integrated into this farming practice including controlled grazing systems, grazing cereals, drought feed reserves, minimum tillage, weed control and confinement feeding. Importantly they have been actively sought over many years, cost benefit evaluated and adapted to work on his farm.

There are also strengths in ensuring that costs are under control particularly with machinery investment and that the business’ goals are well defined.

What are the possible challenges within this system?
Income is related to crop prices. Marketing of the crop is critical to maximising return. It may be that a conservative stocking rate to what is optimal is set, with an associated income opportunity cost. I suspect integrating the Rappa system may allow for increased stock numbers, but needs to be assessed and balanced with additional costs such as labour required.

What could be implemented in the future?
Allen has already identified it as an option, but more seriously and efficiently producing heavy carcase weight lambs using a production feedlot.

Moving to producing SAMM’s as the base ewe flock may be worth evaluating. When introducing new genetics i.e. SAMM it is important to do a controlled “progeny test” to quantify the increased returns from meat, wool or both.
Buckley’s Feed Demand Calculations
By Tim Prance, Senior Consultant Pastures and Grazing Systems.

The MLA Feed Demand calculator enables you to determine the total feed demand of all the livestock on your property, for each month of the year. You can then compare monthly livestock demand to the likely supply of pasture/stubble.

Using this tool will show you
- How much of your pasture your livestock are consuming.
- The size of your pasture shortage, or surplus, at various times of the year.
- How many kilograms of live-weight you produce per hectare.

The MLA Feed Demand calculator is based on CSIRO decision support tools GrazFeed and GrassGro. It is available free of charge from the MLA website at www.mla.com.au, then navigate to the Feed Demand calculator on the right hand side of the screen.

Livestock
- 1200 ewes
- Lambs weaned early December
- Lambs sold by mid January
- 250 Merino lambs kept as ewe replacements

Area of Feed Available for livestock
- 900 ha cereals (sown for grazing)
- 40 ha saltbush
- 400 ha stony, non arable grazing land
- 2950 ha stubbles

Grazing cereal production = 1800 kg/ha DM high quality feed between June and October.
Non arable stony pasture = 870 kg/ha DM between June and October
Stubbles = 1500kg/ha available between November and May
Saltbush = 900 kg/ha during March, April and May

Feed Demand vs Supply

Key Performance Indicators
- Pasture deficit, using freshly grown supply 0 tonnes/year
- Pasture deficit, using supply with carryover 0 tonnes/year
- Liveweight produced, cattle 0 tonnes
- Liveweight produced per ha allocated to cattle 0 kg/ha/year
- Liveweight produced, sheep 73 tonnes
- Liveweight produced per ha allocated to sheep 34 kg/ha/year
- Pasture demand as a % of pasture grown 21 %
Implementing Sustainable and Productive Forage System in the Mallee

There are two pasture curves in the Feed Demand Graph. The light green line shows the potential monthly supply of pasture and stubble (total tonnage of dry matter). The dark green line shows the monthly tonnage of pasture and stubbles, following grazing; assuming that only 2/3 of surplus feed is carried forward from the previous month (i.e. monthly supply less livestock demand with carryover). The columns at the bottom show the total livestock demand for pasture in each month (i.e. what livestock are eating).

Livestock demand takes into account pasture/stubble quality i.e. the metabolisable energy levels.

Where the shaded bars exceed monthly pasture/stubble supply, additional livestock feed will be required. This may come from:

- Supplementary feed
- Increasing pasture growth (e.g. applying nitrogen fertiliser in winter)
- A forage crop.

Pasture demand % (in the key performance indicators) is the ratio of total annual demand of the livestock to the total annual supply of pasture.

Interpretation

On the Buckley farm, there is no feed deficit at any time, as sown cereals and non arable stony ground provide enough sheep feed during June (the month with lowest feed supply) for July lambing ewes. Stubbles provide the remainder. Livestock demand is further reduced as only 250 lambs are kept as hoggets.

During the next most important period for low feed supply on Allen’s farm (November) lambs and/or ewes are run on stubbles or sown cereals. In December lambs are either sold or put into the confinement area. For this system, high quality feed in November for late dropped lambs is essential.

However, on this farm, the overall stocking rate of ewes is still low, as indicated by the very low overall pasture demand of 21% of pasture grown.

Productivity is also low, with only 34 kg/ha live-weight meat produced per year. In other words, this livestock system is efficient, but not productive.

The productivity will be improved by running more ewes, and using portable electric fencing to more intensively manage sheep grazing, which is Allen’s plan. More intensive grazing management will enable surplus sown cereal feed to be carried through winter to provide feed in November.

The reward is to potentially lift ewe numbers to as high as 3000 ewes – provided lambing is kept to July. With this number of ewes, pasture use increases to 47% of pasture grown and, most importantly, there is 67 kg/ha live-weight meat produced per year, plus of course more wool.

Summary

The Feed Demand calculator will show where potential feed shortages occur with such a high number of ewes, and how many tonnes of pasture feed will be required each month for each class of stock. The Feed Demand calculator can also be used to evaluate different scenarios, such as time of lambing and weaning, along with evaluating the best way of filling the feed gaps.

Appropriate risk management strategies can then be put into place.

In this scenario, with 3000 ewes, there is a potential feed shortage in early winter depending on the timing of the seasonal break.

This could be managed by:

- Confinement feeding ewes in autumn/early winter
- Dry sowing cereals at high seeding rates in autumn
- Using efficient summer grazing to carry surplus stubble feed forward into early winter.

The other potential feed shortage is in November. This can be managed by:

- Using a standing cereal crop
- Sowing lucerne as part of a cropping rotation.
- Using efficient winter grazing to carry surplus winter feed forward into late spring.
Crop/ Pasture System Supports Farm Growth

Case Study Three - Kevin, Helen and Lachlan Singh
Interviewed by: Tim Prance

Background

Kevin, Helen and Lachlan, farm 5 km south of Alawoona in a 319mm average rainfall district, with a 192mm growing season rainfall.

Arable area is 3800 ha. There is also some scrub, but this is not grazed. Soils are roughly 30% loam, 30% sand over clay, 30% sand and 10% stony

The Singhs run a 60% crop and 40% livestock mix. The sheep enterprise complements cropping on their farm, particularly with weed control. Sheep are not as profitable as crops in good years, but still provide income in poor years, and over time, provide a more consistent income than cropping, with lower risk.

The farm employs 2.5 labour units, plus casual labour used for shearing, crutching and lamb marking.

Their farming techniques may seem traditional, but they are producing above average crop yields, at low cost, with minimal chemical inputs, and have minimal weed issues.

Kevin and Lachlan are still improving the farms they are purchasing with regard to fencing, water and pastures. They are also gradually accumulating more farming land. Their philosophy is to “work their way up”; therefore new land is purchased if the opportunity arises. It is important for them not to over commit from a risk management point of view. Surplus funds are put into farm management deposits.

Cropping

The cropping rotation follows a traditional two year crop/pasture rotation. Crops grown are wheat, barley, rye and a small area of oats.

The tillage system is conventional, with seeding on 7 inch (18cm) row spacings, followed by a prickle chain. Seed
Weeds that germinate in early summer are sprayed with a Powermax® (glyphosate), Surpass® (2, 4-D amine) and Garlon® (triclopyr) mix. If there are sufficient rains after late January, cropping paddocks will be cultivated to assist with weed control.

For cropping preparation, paddocks are worked once, harrowed and sown with a full cut air-seeder. If breaking rains are early, paddocks are worked up earlier in preparation for sowing. If the break is late, they sow later – some years as late as end of June. Crops are never sown dry, as the machinery is not capable. Crops are not usually sown before May 10th to minimise frost damage at flowering, although the aim is to finish seeding by June 10th. A fertiliser rate of 50-60 kg/ha DAP/MAP is applied with the crops. Breakeven cereal yields are 0.8 to 1 t/ha.

Paddocks with bad rye grass weed problems are sown to oats for hay, and if not enough biomass has been produced in spring for a hay cut, crops are hay-frozen in September with 800ml/ha Roundup Powermax®. Really bad, sandy cropping paddocks are sown to cereal rye.

Lachlan is optimistic about farming in the Mallee. Mallee farmers are very efficient with low production costs, but are always looking at how they can improve. Lachie has recently purchased 400 ha of his own cropping land nearby.

They don’t have any special strategies to hasten recovery following dry spells, as the practises mentioned above are normal on their farm. The cropping issues of most concern are high input costs such as fuel, fertiliser and chemicals; poor successive spring conditions; and low commodity prices.

Livestock

The sheep enterprise consists of 1350 merino ewes, 500 hoggets and 28 merino rams, which are run on about 1800 ha regenerating medic pastures. Medic seed is spread over the whole farm when necessary. This is done with a spreader around mid April into stubbles.

Lambing takes place in April, and shearing in September. All wether lambs are sold off their mothers in August/September at 18-24 kg carcass weight, whilst cull hoggets/old ewes are sold late September.

Grazing

During summer all stubbles are grazed with mobs of between 500 and 750 ewes. Paddock sizes are around 200 – 280 ha, up to 700 ha, but these larger paddocks have up to 8 water points to encourage more even grazing. Water points are a mix of dams and troughs. Only ewes are run over summer.

The combination of large paddocks and soft ground does create difficulty in maintaining ground cover over summer. Hills have been fenced to keep stock off some of these at risk areas. Care is taken, so blow out drifts are not a problem. They avoid using a prickle chain on cultivated dry ground.

Once stubbles have been grazed out, or if they start to move, sheep are moved onto harder pasture paddocks. Oats and hay are then fed as supplements. Ewes are fed on pastures until enough pasture has regenerated. Enough hay and grain is kept on hand for supplementary feeding in paddock or the confinement area.

During winter ewes are rotated around pasture paddocks.
Even in a dry spring there is enough pasture feed to carry ewes through to harvest, especially as lambs are weaned in September. Hay-frozen oat crops also provide extra feed in spring. Pasture paddocks are spray-topped in September. In years with surplus feed, hay is made.

Livestock issues of most concern are the future of mulesing and dipping, and continuing low wool prices. The banning of diazinon sheep dips is a particular issue for the Singh’s, as they have never used any backliner treatments off shears. Dipping has been done in late October to provide cost effective fly protection for the summer months.

By Linden Masters - Sustainable Farming Systems Consultant
Rural Solutions SA

**What are the strengths of this system?**

Not over committing on assets results in expansion occurring at a slower rate, but is still satisfying to maintain a forward progression. Lachie’s purchase of his own land is an indication of their system working for them.

Low cost of production allows room to move as they improve their infrastructure and farming practices.

Use of hay-frozen oat crops in spring allows good nutrition for weaned lambs.

A containment area has several benefits in keeping cover on the landscape while increasing stock numbers. This also can add value to hay and grain from the cropping operation whilst giving flexibility in sales and stock condition.

**What are the possible challenges within this system?**

Accumulating more land is sometimes difficult and it is the second and third generation that reap the rewards of the first. To achieve an objective assessment of assets, outside advice may be required. This should enable the farming system to advance to a level such that it can take greater advantage of seasonal opportunities.

Frost is an issue and can be hard to avoid but with a strong stock emphasis in the program, hay is a proven option. Flexibility in the type of sheep run may become more critical if wool prices remain low and meat continues to dominate the gross margins.

Large paddocks are difficult to graze effectively. Grass weeds in a pasture compromise a cropping situation and often delays sowing. Spray-topping is used but root disease can still be a problem.

**What could be implemented in the future?**

Sowing cereals for grazing is an excellent way to allow a higher stocking rate. This also has the advantage in better seasons that cereals can be reaped putting considerable dollars into the bank. This then gives better options for ongoing land purchases or machinery replacement to get crops in at the optimal time.

A property management plan may be considered looking at land classes, fencing and watering. The use of many watering points has definite advantages but with large paddock sizes feed is often under utilised.
Finding the Right Balance

Case Study Four - Stephen and Anne May
Interviewed by: Tim Prance

Background

Stephen is fourth generation farmer with a young family based 15 km south of Loxton. All land is leased from his father. This assists in keeping overheads and debt low. Steve plans to continue this arrangement with his children, should they wish to farm.

The May’s farm consists of sandy loam soil with sand rises and a small amount of stone. The enterprise is simple and flexible and they are open to new ideas. Cropping is the major enterprise with a small cattle component. They are willing to change the cropping/livestock mix depending on relative economic returns.

The farm has 1.2 labour units, with approximately 1000 hours of casual labour used for seeding and harvest. There is a ready pool of suitable labour available nearby in the Riverland and it is cheaper to employ labour and use slower/smaller farming equipment, than to buy new, wider and faster equipment that uses less labour at this stage.

Strategies to hasten recovery after a dry spell are low production costs and use of farm management deposits.

Cropping

Their cropping system is simple, low cost, and relatively “low tech”, but this is because it costs less, not because they are afraid of the technology.

The whole farm is cropped to cereals with no fixed rotation. Paddocks are sown to wheat, barley or triticale according to yield potential and potential profit.

The property is 100% no-till, using one pass seeding with narrow points on 10 inch (25 cm) row spacing and press wheels. Seed and fertiliser are sown through the same boot.

For cropping preparation, paddocks are usually sprayed with a knockdown herbicide and a pre-sowing sulfonyl urea herbicide is applied before sowing. Different strategies are currently being investigated.

Over summer, weeds are sprayed out with glyphosate and Garlon® (triclopyr) as soon as they appear. Summer weeds are not a problem.

In the past (1990’s) all pasture paddocks were regularly spray-topped to stop grassy weeds setting seed, and any
crops with grassy weeds were spray-topped in spring or cut for hay. Stephen does not let weeds set seed even in a small area of paddock. They have brome, barley and annual ryegrass well under control and these weeds cause minimal problems with their no-till farming system.

Stephen is convinced no-tilling is the best cropping advance he has seen. He can crop his whole farm including the sandy hills, yet retain soil cover over whole farm. Seeding can start early (late April), dry if necessary, and can be finished early (late May). This has improved crop yield reliability in a very dry cropping area. Time input into seeding is much less than it was 10 years ago, and the whole cropping operation is much more relaxed. Steve is now cropping twice the area as he was 10 years ago for a similar cost.

Steve has shown low yielding crops can be profitable, if production costs are low. On this farm, cropping overheads are low, weeds are under control, there is a low investment in machinery, and fertiliser input costs are low (crops are fertilised to previous years yields). Low yielding paddocks on this farm are now profitable.

Cropping issues of concern include unreliable income due to yield fluctuations. Cropping equipment is expensive and it is important to get a return on investment. A drop in grain prices below $180/tonne is also a concern.

Livestock

Stephen runs a self-replacing cow calf livestock system with calving ranging from May to July. The calves are weaned at around eight months old, finished in their own confinement area to 350-380 kg live weight and then sold at 10-12 months of age in winter.

Grazing

The cattle graze the sown crops as required. Electric fencing has been used for grazing management in the past, but cattle numbers have been reduced by half in the last two years in favour of reaping more of the crop area for grain. This has reduced the need for intensive grazing management.

Grazing trigger points include ground cover, lack of feed and declining stock condition. The confinement area, grain and hay on hand, assist Stephen to maintain a good ground cover to prevent wind erosion.

The cattle graze the stubbles over summer, and the calves are weaned in autumn/early winter into the confinement area. Ground cover of stubble is carefully watched, and stock moved to other paddocks when required.

Stephen would prefer not to graze stubbles excessively if possible. If the cows run out of feed in late summer/autumn they will also be put in the confinement area.

In winter some of the sown crops are used for the breeding cows and the confinement area is used for the weaners and breeding cows in late breaking seasons. In spring sown crops are also grazed.

Stephen concedes it is difficult finding the fit for livestock in a low cost cropping system. Livestock numbers have already been reduced from 20% to 10% of the farming area, and may even be reduced further. Sentiment is the main reason that livestock are still in his system.

The farm currently lacks quality livestock infrastructure such as yards, water and fencing. Upgrading this infrastructure would be expensive.

Livestock also lack profitability relative to cropping. A highly efficient farming system, with low break even yields,
Implementing Sustainable and Productive Forage System in the Mallee

By Bruce Hancock - Senior Livestock Consultant
Rural Solutions SA

What are the strengths of this system?
The low cost of production of cereals and low break even yield through management of both variable and overhead costs is a real strength. Actually knowing and annually calculating the Cost of Production is one of the most valuable farm business tools.

The availability of nearby quality labour in peak seasons is a real asset and once again decreases overheads.

Cattle are a good choice on sandier country as they don’t selectively graze and tend not to camp or dig on the rises.

What are the possible challenges within this system?
The Triticale in the rotation will hopefully be providing a cereal root disease break, but this may require monitoring.

There is mention that livestock compete with the cropping enterprise and they maybe scaled back even further, so time may well be spent identifying the issue/competition, quantifying the cost or loss, and then exploring other ways to manage it.

There is concern about the cost of upgrading current infrastructure for the cattle like water systems and points and electric fence, so perhaps a ‘development budget & payback period’ vs ‘labour saving’ exercises maybe of value to help explore its worth.

What could be implemented in the future?
Given Stephen doesn’t want to graze stubbles, perhaps a ‘cattle trading’ enterprise where weaners are bought in autumn/winter, graze the winter sown cereals and are sold or feedlot in late spring might be more complementary with the cropping. Heifer agistment, might be another option to explore.

Either way, given the cost of production is known for the cereals, a cost of production on the beef enterprise, whether breeding cows or cattle trading could be done.
Cattle: An Opportunistic Enterprise

Case Study Five - Peter and Di Rose
Interviewed by: Mehdi Zaboli

Background

Peter Rose started no-tilling around 10 years ago and firmly believes it is the only way to farm in the Mallee. If Peter has to go back to conventional practices he says he will give up farming altogether.

Peter’s farm is a one-man operation consisting of 640 ha owned, and 500 ha leased. Soil types are 50% loam, 30% sand over clay and 20% stone. Almost 80% (850-900 ha) of the farm is cropped to mainly wheat, triticale and barley. Peter also runs up to 50 cows and calves depending on feed on offer and livestock price.

There is a clear focus on keeping enough stubble on the ground during summer to minimise erosion and save moisture for following crops. Over the years Peter has observed that where ground had cover over summer, crop establishment was much better the following season.

In 10 years time, Peter hopes to be one of the leading producers in the area, with a focus on having the most sustainable farm. Although he wants to see his farm producing more than what it does currently, it must take place with less pressure on the environment.

Peter’s keys to success include implementing no-till on wider row spacing; electric fencing for controlled grazing; and maintaining grass-free paddocks.

Cropping

Crops are sown using a Shearer Trashworker with knifepoints and press wheels on 12 inch (30cm) row spacing. Sowing north-south has also helped to minimise wind erosion in paddocks.

At a Glance

Location: Wyanrka
Total Area: 1140 ha
Annual Rainfall: 350 mm
April-Oct Rainfall: 275 mm
Main focus of enterprise: Cropping 85%
Livestock 15%

Paddock preparation involves spraying with glyphosate and amine herbicides in summer to control weeds. This helps to conserve moisture in the soil profile. Low rates of Logran® (triasulfuron) are applied in the knockdown spray pre-sowing.

Peter tries to maintain a grass-free cropping system, and this is an important driver for planning crop rotation. As soon as grassy weeds such as brome grass are present, the paddock is put back to pasture. Weeds can then be controlled using a grass selective or timely spray-top operation.

This country has been continuously cropped for over twenty years.
Around 200ha of barley or triticale feed is dry sown with 20 kg/ha MAP fertiliser. These paddocks are used purely for grazing without any intention for grain harvest. Grazed feed paddocks are hay-frozen, usually in September, to keep paddocks grass free for the following year.

Legumes are also sown in paddocks that may have nutrition or weed problems. Legumes are grazed early and then sprayed in June or July to selectively remove grass weeds. Nitrogen fixation in the soil is another rotational benefit. A vetch and canola mix has been sown for grazing in 2009.

In his cropping phase Peter indicated costly inputs such as fertiliser and chemicals as his main issue, followed by high levels of Rhizoctonia and lack of cereal varieties with CCN resistance.

Livestock

Peter's cattle herd number fluctuates between 5 to 50, and his decision to trade in or sell is based on opening rainfall after seeding and market price of cattle at the time.

Peter aims to keep calves until they reach 350-400 kg live weight, but adequate feed supply and soil erosion risk are the main drivers in his decision to keep or sell early.

Grazing

Over the year cattle are grazed on sown cereals, regenerating broadleaf and medic pastures, and stubble paddocks.

Rotational stubble grazing combined with grain hand feeding, are Peter's strategies to carry cattle from November through to April. Cattle enter fresh stubbles on a weekly basis. Once stubble height is reduced to 25-30 cm, cattle are removed and shifted to the next paddock. This continues until the end of April.

Supplementary grain is fed at 2kg/head/day, however the source is highly dependant on what is left over from the previous year's harvest.

In wet summers cattle numbers are maintained and paddocks are sprayed for summer weeds up to three times. In a dry summer the same pattern of grazing is maintained with a focus on keeping enough stubble on the ground and possibly no weed spraying.

Peter believes that small sized paddocks (36 ha) give him the ability to graze evenly and closely monitor paddocks for adequate stubble cover. This prevents soil erosion and fulfils his ultimate objective for a sustainable enterprise. The next step is to increase paddock size as electric fencing becomes fully integrated on the farm.

In winter Peter tries not to bare out paddocks with grazing. One in three years, there may be a wild turnip infestation in a grazing paddock and this is managed with a spray-graze or hay-freeze.

Peter's grazing management is based on his ability to predict feed on offer and trade in or sell stock when necessary. During times of extra feed more cattle may be purchased if the price is right. Otherwise feed may be cut for hay or sprayed out to let the organic matter go back in to the soil. In tough times and very low feed periods Peter will sell stock rather than rely on costly hand feeding or jeopardising paddock cover.

Stock water is mains supplied with 32 mm pipe. Peter believes this is expensive to run and is going to be even more expensive in coming years. Permanent troughs are

Cheap light-weight troughs are used to feed grain and are moved frequently to avoid erosion.
located in corners of paddocks and this can cause soil erosion. There are plans to purchase portable troughs, so troughs can be moved around the paddock.

In the livestock system, Peter finds soil erosion, compaction, water cost and quality as the main barriers to maximising profitability.

By Albert Singh - Senior Livestock Consultant
Rural Solutions SA

**What are the strengths of this system?**

The biggest strength is the making of considered decisions. These decisions may be different to what the majority may be thinking, but they are importantly based on observations over many years. There is a passion and drive to protect the soil resource, and Peter has devised ways of best achieving this from his experiences, research, and what he has seen and learned since a child.

There is a strong will to succeed.

The system is crop driven, with strategies aimed at maximising crop yields, coupled with a strong drive to protect the soil resource. As such, livestock are a secondary and opportunistic enterprise to utilise some of the dry matter produced, from the necessary crop rotation breaks aimed, in part, at assisting with weed and disease control.

Fattening bought in young cattle is the livestock enterprise of choice and this trading option gives much flexibility. Cattle require less labour than sheep.

**What are the possible challenges within this system?**

With cattle trading the return is from weight gain/ha. Perhaps the system could be tightened up to learn more about cattle breeding. Then identify good sources of cattle that are sired by bulls with good Estimated Breeding Values for the traits required to get the most out of the feed base. Could be that fast growing, lean animals best maximise returns. Might as well run the most profitable animals you can.

**What could be implemented in the future?**

It has been identified that grazing returns may be improved by introducing more intensive strip grazing within small paddocks using electric fences. This can be done either through increased daily weight gain, or increasing overall numbers. Site of watering points was of concern so perhaps a mobile watering system will help; just like droving cattle in the outback!
Healthy Sheep Pays Dividends

Case Study Five - Bruce, Gaylia and Robert Pocock
Interviewed by: Tim Prance

Background

Bruce, Gaylia and Robert farm 20km north-west of Lameroo, in a 320mm average rainfall district, with a 220mm growing season rainfall. They also have a grazing block between Meningie and Coonalpyn with 450mm average rainfall. Property size is 2680 ha including 680 ha at Meningie. The farm’s soils are mostly loams and sand over clay soils, with sand hills and a few stony patches. All land is arable.

The Pococks manage a fourth generation farming operation, where sheep and pastures are a key part. On average one in five years sees crop yields and grain prices lower than the break even cost of production. However, this has occurred now for the last 6 successive years resulting in a greater emphasis on livestock for productivity. Priority is therefore given to animal welfare. Healthy, well fed and well watered sheep are important for farm profitability.

The livestock are run as a Merino stud at Lameroo and a commercial flock at Meningie. Their properties, spread over wide distances, are well planned with good fences. There is also easy access to paddocks for livestock inspection and movement.

The farm utilises 2.5 labour units, plus casual labour is used for shearing, crutching pregnancy, testing and fencing.

In the future, the Pococks see more farm machinery sharing/syndication; rapid changes in technology; more efficient use of fertiliser and chemical inputs; and increasing use of DNA and pedigrees to assist with identifying the most profitable genetic markers in their stud. They can also see themselves share-farming for a corporate investment owner; at least for some of their farming income.

Cropping

1200 ha is regularly cropped, including the 350ha sown to sheep feed. The remaining 1480 ha is occasionally cropped.

A typical rotation on heavier soils includes wheat, wheat, barley, lupins and oaten hay. This is followed by one or two years sown sheep feed such as barley and vetch, oats and vetch or straight cereals.

On lighter soils, paddocks are only cropped before renovation. These paddocks carry a pasture of lucerne, perennial veldt grass, evening primrose and medic. Hay that is produced is used for rations in the feedlot, supplementary feeding during lambing and containment feeding in low feed periods.

All cropping paddocks on heavier soils are sown 100% no-till. Seeding is on 12 inch (30cm) row spacing with knife points and press wheels. Seed and fertiliser are sown through the same boot. Prior to sowing, paddocks are sprayed with a “double knock”, glyphosate followed by Sprayseed® (paraquat/diquat) plus pre-emergent chemical mixes at sowing.

Sulfonyl urea herbicides are very rarely used in grain and hay
crops. Sulfonyl urea sprays are avoided to minimise rhizoctonia crop interactions which can lower plant biomass.

Summer weeds are controlled when at mid size to maintain soil cover and to also minimise water loss and evaporation. In pasture paddocks summer weeds are usually left for livestock.

Crops are direct drilled using Variable Fertiliser Rate technology based on EM38 surveys. Rates vary from 20 - 65 kg/ha DAP. Pasture paddocks receive 50 kg/ha single super at least once every two years if not annually.

If paddocks containing perennial veldt grass are cropped, then cropping preparation may include use of tandem off set discs to level out veldt grass clumps on the lighter soils. This also aids with the wetting and disease reduction in the soil.

Cropping issues of most concern are high input costs such as fuel, fertiliser, chemicals and labour; coupled with low and erratic grain prices.

Livestock

1350 Merino ewes (including 800 stud ewes) are run on both properties. Lambing takes place in May. There are also 700 - 750 ewe hoggets, and 150 Merino rams (including 120 young sale rams). Special attention is maintained on the flock breeding objectives i.e. breed big plain bodied, heavy wool cutting and fertile sheep that require little maintenance.

Most sale stock is sold in October/November, usually for breeding, except for Merino wethers which are sold for meat any time from weaning in August at 18-25 kg carcass weight. Generally no sale stock is carried over during the summer – only breeders.

The ewes are mostly 21-22 micron and are selected for twins. All ewes are scanned in March, and conception rates of over 150% are common, often resulting in 110% lambs weaned.

There are two shearings – March and September. This is necessary because the heavy wool cutting ewes grow too long staple wool. Ewe Hoggets are shorn within 10 months for the same reason.

Shearing twice means wool length is not excessive (averaging 60mm in spring and 65mm in autumn). It also eliminates the need to crutch ewes, but does result in slightly lower yield in the wool over summer as the wool is shorter as well as easier lambing and general sheep husbandry. On balance, Bruce and Robert consider shearing twice pays for itself, even after allowing for the extra cost of contract shearers and handling.

The wool they produce has a high tensile strength with no break, and there are minimal fly problems over summer. Potential lice problems are also eliminated. Pococks have four separate blocks at Lameroo, so animal health is always a potential problem, especially when running a well recognised sheep stud.

Pastures

The Pococks aim to dry sow cereals especially barley (around 350ha) for early grazing in the first week of April. This supplements the 170 ha regenerating medic, 50 ha regenerating volunteer weeds and 690 ha lucerne/perennial veldt at Lameroo, and 680ha lucerne/perennial veldt/evening primrose at Meningie.

The remainder of crops are sown soon after the ‘break’. Cereals for grazing are hay frozen with glyphosate or Gramoxone® (paraquat) in September to control brome and silver grasses, if present. Regenerating medic pastures may also be spray-topped in September, but using Gramoxone® to minimise impact on medic seed production. Bruce and Robert try to include a Timerite™ application at the same time to minimise red legged earth mite numbers the following season.

Grazing

Over summer all stubbles at Lameroo are grazed. There are four mobs (two of 400 ewes, one of 700-750 ewe hoggets and one of 150 rams). They rotationally graze and are shifted every 3-7 days with daily monitoring during heat waves.

At every shift, troughs are cleaned. Supply of fresh clean water is considered essential for healthy stock and for even grazing across the paddock. Water is supplied from bores, and is reticulated around the farm using 50,000 – 100,000 litre tanks, plus smaller tanks near troughs. Water quality is high. Most troughs are in fence lines, so are able to supply water to two paddocks.

Once sufficient feed is available after the opening break, stock are grazed over pasture insuring the feed is short and does not become too rank. Once lambs are marked they usually go into sown feed paddocks.

Sheep are rotationally grazed on cereals, regenerating pastures...
Implementing Sustainable and Productive Forage System in the Mallee

By Albert Singh - Senior Livestock Consultant
Rural Solutions SA

What are the strengths of this system?
This farming enterprise has a balanced diversity of operation producing crops, Merinos for wool and lamb production, and Stud Merinos that hedge risk.
The Pocock’s have a strong agenda to be viable and a culture of assessing and taking a business approach to options. These successful options include reducing machinery costs by considering syndication; targeted application of fertilisers and sprays; and selling their experience to corporate agricultural property investors, to get a return without the outlay of purchasing land. Options are trialled and importantly evaluated such as shearing twice per year. This system will not suit many but the rigour of analysing the impact of these types of alternatives on the business, is a critical success factor.
There is also a strong emphasis on producing a quality product as demonstrated with attention to grass seed control with sheep production, and nutrition for producing Stud Merinos.
Another asset to the business is the overriding aim to keep ground cover while making a profit and managing stock accordingly. Rotationally grazing perennial pastures to optimise return; having defined dry matter triggers that indicate the stock should be removed from stubbles; and reducing to a minimum the number of stock to be carried over summer are all valuable practices. Cropping rotations are different for the heavy and light soils and direct drilling all contribute to maximising ground cover during the year.
High reproductive performance and routine weaning percentages of 110% indicate pre mating and pre lambing nutrition is excellent from the pasture system to ensure the higher numbers of twins survive as supplementation is not usually given. High reproduction rates allow for increased culling pressures to be applied and increased surplus stock for sale. Ultrasound pregnancy scanning of ewes should allow for early culling of dry ewes and preferential nutrition can be given to twin bearing ewes.
A grain legume break in the rotation allows for good grass control.

What are the possible challenges within this system?
May not be maximising the return from Merino sheep as nutritional needs for Stud Merino production and presentation could require a reduced annual stocking rate for stud sheep compared to commercial merino production with an associated opportunity cost.

What could be implemented in the future?
Lambs could potentially be marketed better and the opportunistic confinement feeding could be used as a production feedlot to produce heavier carcase weight lambs for sale.
With the use of portable electric fencing the control of grazing could potentially be further improved. There is potential to increase annual stocking rate bringing greater annual returns, however the increased labour requirements, water sites would need to be assessed. Using Australian Sheep Breeding Values (ASBV’s) together with the stud enterprise will enable any stud breeder to both bring in the best external genetic material affordable for the breeding objective. This also gives their ram buyers better information on their ram purchases.
Feed-lotting and mixed livestock enterprise

Case Study Six - Denis, Adrian, Paul Roberts and families
Interviewed by: Mehdi Zaboli

Background

Adrian and Paul Roberts, along with their father Denis and their mother Jenny, own and operate a well-established mixed farming business northwest of Karoonda. They are well into no-till cropping, utilising grain & graze and confinement feeding techniques to carry their livestock throughout the year.

4050 ha, nearly the entire farm, is arable with only 50 ha non-arable and scrub. The majority of the arable land is sand over clay. Around 2000 ha is cropped every year with the remainder in pasture and this is managed with 3.5 labour unit plus some seasonal shearsers.

The two young farmers and their father make a good team combining wisdom, experience and energy. In 10 years time Denis plans to retire and the two brothers and their families will be running the business. They are planning to purchase more land to crop if the opportunity arises.

Cropping

The continuous cropping rotation is usually barley, barley, wheat with either triticale or cereal rye as break crops. All crops are sown using no-till, with a Flexicoil air seeder, knife points, press wheels, and 9 inch (23cm) row-spacing.

Summer weeds are controlled primarily with grazing using either sheep or cattle depending on soil type. Stock enter a paddock as soon as the crop is harvested. Herbicides are used to control weeds if, and when, good summer rains are received. This strategy is not usually employed before mid January.

To prepare paddocks for cropping, paddocks are grazed hard after summer spraying to reduce weed populations and growth. Soil erosion is a consideration and grazing is managed accordingly. Every attempt is made to keep standing stubble in paddocks until seeding. Stubble height is used as an indicator for grazing management decisions. Cattle and sheep confinement feeding are used to remove stocking pressure from vulnerable paddocks and help maintain adequate stubble cover.

About 10-15 days after the opening rain, knockdown herbicides are mixed with trifluralin and applied pre-sowing for weed control. Group B sulfonyl urea (SU) herbicides have not been used for the past two seasons (2007 and 2008), although they may still use Ally® (metsulfuron methyl) every now and then where needed.

Cereals are sown for feed and there is a strong preference for cereal rye, followed by Maritime barley. Feed crops are normally
Implementing Sustainable and Productive Forage System in the Mallee

Hay is an important aspect of the livestock rotation and is therefore grown on the farm and stockpiled. A hay-baler will be purchased in the future for contracting and to help facilitate hay production on the farm.

A mixed livestock enterprise adds diversity to the business, helps manage risk and pay the bills.

Confinement feeding is a critical strategy in minimising soil erosion.

Having a two-year hay supply is important to have the confidence to carry livestock especially in dry years.

Sown cereal feed allows flexibility in terms of end use, i.e. grazing, hay or grain production.

Frost is a regular issue for Karoonda croppers and the Roberts family overcome this hurdle by sowing their frosty paddocks last. These paddocks are also managed using dual-purpose cereals. Cereals are grazed and then left for grain production. The grazing has the benefit of delaying flowering, which can be a useful frost management tool.

The main difficulty the Roberts family faces with cropping is low commodity prices versus the high cost of inputs. This directly affects the risk exposure of the business and maintains the importance of livestock to the farming operation. Keeping up with the cost of new technology to avoid falling behind is also a constant challenge.

Livestock

Sheep and cattle are both a part of the livestock enterprise. The sheep flock consists of 1200 self-replacing Merino ewes, 400 hoggets, 30 rams, and 9 crossbred rams. There are four main mobs that are classified based on their age, averaging 270 sheep per mob. Maintaining their sheep bloodline that goes back 70 years is of primary importance when decision-making.

The move into cattle has been a gradual process and not something that was entered into hastily. The Roberts started with 36 head of cattle 12 years ago and have gradually built up to 180 heifers and 5 bulls, a number they would like to maintain for the next few years. All agree the cattle market is a good market to get into however it takes three years to see a return on an initial investment.

In their long-term plan Adrian and Paul have also considered going into pigs, as long as they see a good return on investment in the future.

Grazing

Over the year grazing is managed on 2000ha of cereal stubble, 250ha of sown cereals, 1700 ha of regenerating medic pasture, 42 ha of lucerne and 6 ha of saltbush.

Winter feeding strategies vary depending on conditions. In winters with little pasture growth, hand feeding with hay or a lick-feeder is maintained. If there is higher than normal feed available in the paddocks, extra wether lambs may be purchased after weaning around late August to get extra wool cut (up to 400 depending on price and origin).

In the case of dry spring conditions, paddocks sown for hay are grazed instead of cut. Supplementary feeding also takes place with older hay stocks and supplements.

Lambing takes place in April to May, and calving from March to June. In this system lambs are sold in May with 22-24 kg dressed weight, and ewes are culled in September.

Confinement Feeding

Approximately 180 tonnes of hay and 60 tonnes of grain are fed through the containment feedlot. A lick-feeder is used with a feeding tray and there are no problems with grain toxicity/poisoning with this system in place.

As a rule of thumb, cattle are confinement fed for 55 days between January and June, depending on when the cattle are weaned. Commonly young cattle are fed from February to
May and then sold with a target weight of 200-220 kg dressed (480+ kg live weight), mainly to Victorian markets. Finishing lambs are confinement fed in January to be ready for sale in February or March.

The feedlot mixture for sheep is two-thirds triticale or barley grain with one-third lupins, although the cattle and lambs also receive 1 bag of Mt Compass additives per tonne of feed. The grain for cattle is rolled (crushed).

In the livestock phase, their main issue is finding available shearsers at the right time, although they manage to shear their sheep in July each year.

专家评论

专家评论

**What are the strengths of this system?**
The Roberts run a wide range of livestock enterprises – a self replacing merino flock, prime lambs and a self replacing beef herd. Weaners are finished in a feed lot for sale in autumn and winter.

There are three family members available to manage both crops and livestock at critical times of the year – especially at seeding.

There are a wide range of pasture options for their livestock – ranging from sown cereals, to regenerating medic, lucerne, salt bush and regenerating pasture. The Roberts also use confinement feeding, and stubbles are available when paddock feed runs out.

I like the idea of having two years hay supply on hand to provide the confidence to carry more stock.

A mix of sheep and cattle provides them with a big range of grazing options during summer. They have a reasonable scale of livestock activities – running about 5000 DSE average for the year. This means it is worth investing their time into making livestock profitable.

They do their research before jumping into a new enterprise

**What are the possible challenges within this system?**
Calving period is spread out over 4 months (March to June). Ideally calving should take place over a condensed period (say 9 weeks) to maximise cow efficiency, and profitability. A spread out calving, may mean some cows are calving every 14 months, instead of every 12 months. This reduces the profitability of a beef herd, by increasing the range of weaning weights, meaning more animals have to be finished on grain.

Cattle have a higher water requirement during summer, so a good stock water supply is essential. Water quality and a high water flow rate are more important for cattle compared to sheep.

**What could be implemented in the future?**
Winter stocking pressure is about 7200 DSE on 2000 ha grazing land. This is quite good, but potentially could be higher, with 10,000 DSE a reasonable target. Dry sowing cereals into regenerating medic pastures will help improve winter carrying capacity, along with more intensive grazing management during early winter to obtain a winter feed wedge.

A small amount of lucerne is grown on this farm. Lucerne has the potential to fill the feed gap between late spring and when stubbles are ready. Lucerne can also provide a legume “break” in a cereal rotation - providing options for weed and disease control, plus improving soil fertility. However lucerne is very expensive to establish and will suck out soil water required for crops. Also, intensive grazing management, with a minimum of 6-8 paddocks (and preferably more) are required in the grazing rotation to make the most profitable use of lucerne.

With good rotational grazing and feed budgeting skills, lucerne can be managed to carry 20 DSE/ha in the period from October to December even in a low rainfall area.

By Tim Prance - Senior Consultant, Pastures and Grazing Systems
Rural Solutions SA

专家评论
Improved Yield Reliability with No-Till

Case Study Seven - Paul and Briony Rudiger
Interviewed by: Tim Prance

Background

Paul and Briony farm just out of the Loxton Township, on the edge of the irrigated horticulture area. The farm soil is a sandy loam with sand rises and there are small areas of limestone out crops. Paul is a third generation farmer with a young family. The future will depend on what the family decide as they get older.

The farm currently runs with 1.2 labour units, plus casual labour employed for seeding. There is a ready pool of suitable labour available nearby in Loxton.

Strategies for low rainfall farming and ways to hasten recovery after a dry spell include low production costs and use of farm management deposits.

Cropping

Most of the farm is cropped to cereals, predominantly wheat with a small area of barley, oats and cereal rye. Two to three wheat crops are sown before the paddock goes back to oats, barley or cereal rye. There is no fixed rotation.

The property is 75% no-till (one pass seeding with knife points) and 25% minimum-till (one cultivation for onion weed control before a knockdown spray, and sowing with knife points). No-till is the preferred option, with minimum tillage only used in paddocks where onion weed is becoming a problem. Seeding is on 12 inch (30 cm) row spacing with press wheels. Seed and fertiliser are sown through separate boots using a modified Flexicoil with Harrington knife points.

For cropping preparation, paddocks are sprayed with a knockdown herbicide before sowing. Paul is cautious about using sulfonyl urea (SU) herbicides, so their use is restricted to paddocks containing onion weed and usually only paddocks coming out of the sown cereal pasture phase.

All cereals are sown with 40 kg/ha MAP fertiliser.

Summer weed control is considered very important. Summer weeds are sprayed with glyphosate as soon as they appear. Two summer sprays are applied if necessary.

Crop area is slowly increasing, but more crop is now being grazed. Medics are no longer sown for stock feed, but there is 100 ha of lucerne.

About 400 ha of grassy weed paddocks are sown each year for grazing. Oats are sown on loamy soils and cereal rye to paddocks containing sand hills. These paddocks can be spray-
topped, if necessary, to control grassy weeds before going back into five years of cereal grain production.

Grassy weeds are not generally a problem on this property even with no-till. If grassy weeds are present, a crop can be sown for grazing, then spray-topped in spring.

About 40 ha of cereal crop, plus some stubbles, are baled for hay and straw for confinement feeding and for paddock feeding.

Paul says no-till and minimum-till is the reason why he is still farming in a low rainfall area. He can crop his whole farm, including sand hills, yet retain soil cover over the whole farm. Seeding can start early (late April), dry if necessary and can be finished early (late May). This has improved crop yield reliability in a very dry cropping area. Time input into seeding is much less than it was 10 years ago and paddocks have been cleaner from weeds since direct drilling.

Low yielding paddocks on this farm are now more profitable than they were previously.

Paul doesn’t like loosing valuable cattle feed which is a consequence of cropping orientated operations such as spray-topping and summer weed spraying. However, grazing cereals has greatly helped to provide feed for livestock and to control weeds in crops.

Livestock

Paul and Briony run a Murray Grey beef herd of 80 breeding cows, calving all year around. Following weaning, calves are finished in their own confinement lot, along with around 200 purchased animals.

Animals are marketed at 400 – 450 kg live weight for steers and 300 -350 kg live weight for heifers. They are sold in local market every fortnight. About 250 head per year are confinement fed.

Paul enjoys running cattle, but they can’t compete with cropping for income so cropping has to take precedence. It can be difficult to manage livestock to prevent conflict with cropping operations. This problem may be reduced by tightening up the calving pattern in the future.

Grazing

Cattle graze 400 ha of sown crops, 100 ha lucerne and 400 ha stubbles.

Ground cover in stubbles is carefully watched, and stock moved to other paddocks when required. Cattle are grazed in two mobs: cows and heifers. Cattle are very useful to clean up unharvested heads especially in low yielding crops where it is a greater problem. This helps to prevent grain contamination in subsequent crops. Grazing trigger points include ground cover, lack of feed and stock condition.

Paul always tries to retain one stubble paddock which hasn't been sprayed (or grazed) over summer for cattle grazing at the seasonal break. This is especially useful in a late breaking season. Paul also has access to a neighbouring property (which has no livestock) for summer grazing if required.

Water is supplied from mains water, with troughs located in the centre of most paddocks to improve grazing efficiency. There is a network of 10,000 litre storage tanks on the property to provide water back up in summer. Troughs are large, with flat bottoms, to prevent cattle rubbing and shifting them.

Shelter belts have been planted in all paddocks, either along fence lines or in corners, to minimise wind damage to paddocks being grazed.

In autumn, three mobs of cattle are rotated through paddocks to clean up any green feed, such as crop regrowth, plus at least the one paddock of ungrazed stubble.

After the breaking rains oats are dry sown for grazing, plus cereal rye is sown on sand hills.

Paul and Briony’s property is set up with electric fencing, using a single outrigger wire on existing fences, so paddocks are subdivided for strip grazing as required.

Broad leaved weeds are also spray-grazed for cattle feed. Grassy weeds are mostly spray-topped.

Hay is made in spring if there is surplus paddock feed. Paul has his own round hay baler which is also used for contract work off farm. In years when paddock feed is short, hay is fed to cows. Calves can also be weaned earlier and put into the confinement area.

The major concerns with running livestock are losing cropping ground to grazing animals, weed seeds produced on unsprayed paddocks, and the build up of weeds in the pasture phase including summer.
By Bruce Hancock - Senior Livestock Consultant
Rural Solutions SA

What are the strengths of this system?
Paul & Briony have developed a business that focuses on low input costs, but more importantly, low overhead costs, which has the biggest influence on a low cost of production. In particular, livestock trading is the most profitable livestock enterprise and ensures excess capital is not tied up in breeding cows that use 70% of the feed they eat to just maintain themselves. In addition, labour is usually the biggest overhead on any farm, but their permanent labour is very low for such an area.

Owning their own haymaking equipment ensures the critical timeliness for the making of high quality hay. Also some off-farm work is readily available to reduce the depreciation cost of such machinery to the farm.

As stock are marketed every fortnight it’s envisaged they would have a good reputation with their livestock agent and buyers. The fundamental resources for easy cattle management appear in place. That is, a good water system and electric fencing to ensure they stay where they are put and don’t degrade the conventional fencing.

There is a good balance of natural resource management trigger points when grazing with monitoring of ground cover, quantity & quality of feed and stock condition. There are also many shelter belts.

One of the biggest “risks” is feed/fodder and it appears that more than adequate fodder reserves are at hand through sown crops, hay, straw and nearby agistment.

What are the possible challenges within this system?
The continuous cereal cropping could be creating a root disease risk that would require monitoring via crop inspection and summer soil testing. It’s acknowledged that yields have become more reliable through the timeliness of sowing with no-till, but there could still be a subliminal yield reduction occurring from root disease.

Fortnightly livestock marketing requires an increase labour for preparation and transport, but over time, processes can be developed to manage the labour component.

What could be implemented in the future?
The calculation of a two livestock gross margins (breeding and trading) including the cost of sown feed could be enlightening as 400Ha @ $75/ha = $30,000 ÷ 50 cows and calves and 200 yearlings = $120 per head. Although appearing high, this could still be a cheaper feed cost per DSE, than many sheep breeding operations in the district.

Given growth rate and muscling are key profit drivers in cattle finishing, are yearlings with known and described genetics being sourced or is it only based on past performance, which is better than having to source yearlings from different suppliers every year.
Case Study Eight - Patrick, Kevin & Carmel O’Driscoll
Interviewed by: Linden Masters

Background

Patrick and parents Kevin and Carmel O’Driscoll run a mixed farming operation just north of Lameroo. 1400ha of land is red loamy soil and the remaining 500ha is sand.

Patrick values his SANTFA membership, his mates, and his local Ag Bureau for giving him a forum to communicate ideas on how to improve his business.

The O’Driscolls are concerned about the ability of a relatively small operation to remain viable into the future with rising costs. Succession poses a threat of reduced availability of labour. There are no immediate plans for the business except consolidation, improving the businesses ability to generate profit, and the reduction of debt.

Cropping

Approximately 1200 ha of the O’Driscoll’s farm is cropped with wheat, barley, oats, triticale, lupins and occasionally canola. A typical rotation will include wheat, wheat, barley, followed by a break of lupins, canola or a vetch/oats hay mix.

This year’s fertiliser program for cereals consisted of applying 24kg/ha DAP together with 36kg/ha of Urea. This rate is lower than the norm but was calculated according to financial constraints and the fact that there was still phosphorus remaining in the soil from previous low production years.

The O’Driscoll’s cropping enterprise is 95% no-till. They use a Flexicoil ST820 and Simplicity box with 9 inch (23cm) spacings and can split seed and fertiliser if necessary. The use of Sulfonyl urea (SU) herbicides is normally restricted to around 25% of the area used in the cropping program. Paddocks are prepared for cropping using stock grazing pressure, spray-topping and summer weed control, particularly on any silver leaf nightshade.

Patrick believes cropping carries a very large risk in many seasons and the end price for commodities often does not reflect the cost of production.

Upgrading machinery in the future will become more difficult due to the high cost. This may lead to some big changes like syndication of farming plant.

Livestock

The O’Driscoll’s farming enterprise has a strong sheep component. They buy in quality Merino ewes and use prime lamb sires (black Suffolk’s) to produce lambs which are sold when at least 20kg dressed weight.

The 1250 Merino ewes and 25 black Suffolk rams are grazed on 625 ha of medic based pastures, and early sown triticale and oats for feed. Approx 200 ha consists of fenced hills with regenerating

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Implementing Sustainable and Productive Forage System in the Mallee

Annual supplementary feed includes 100 tonnes of hay, 20 tonnes of oats, 80 tonnes of barley and 10 tonnes of lupins. Some of this feed is used to top up lambs in a containment lot, while the rest is paddock fed to pregnant ewes in the later stages of gestation. Paddock feeding is most common for ewes. Containment feeding of grain on hand allows a high stocking rate while maintaining good ground cover to prevent wind erosion.

Lambing occurs from May to June allowing lambs to be sold during September to November and February to April. Cast for age (CFA) ewes are sold in October. Depending on when a mob of ewes lamb, they are either shorn in April or August. The availability of labour is also a concern for the future.

Grazing management

Better quality stubbles are preferentially grazed and salt blocks are used. Grazing trigger points include ground cover, lack of feed and stock condition. In autumn supplementary feeding is often provided as well as the oats and triticale that are sown early for feed.

In winter, grass and medic based pastures are grazed. Animals in a confinement area will remain there until there is enough paddock feed available. In years with excess spring feed it is either cut for hay or more lambs may be purchased.

Grain and hay are kept on hand for supplementary feeding. The area sown to hay usually increases following a dry season. Some new season hay is kept for stock and some is sold. Confinement feeding, agistment and buying in lambs also allows flexibility of stocking rate and enables better management of seasonal variability.

What are the strengths of this system?

Purchasing breeding stock allows a better flow of production without having to give special preference to growing out hoggets.

Confinement feeding and having grain on hand assists in managing seasonal variability.

Stock compliment cropping by cleaning cropping paddocks.

By Tim Prance - Senior Consultant, Pastures and Grazing Systems
Rural Solutions SA

What are the strengths of this system?

Purchasing ewe replacements means all DSE's are tied up with productive stock, with no need to carry weaners/hoggets as ewe replacements. All young animals are sold for meat. This is a highly productive and profitable way of running sheep.

There is a good spread of lamb marketing opportunities on this farm – from September right through to April. The time of lambing suits shearing time, and may well be influenced by availability of labour.

I like the good range of grazing opportunities on the O’Driscoll farm – ranging from medic pastures to sown crops, stubbles and non arable hills.

What are the possible challenges within this system?

Sourcing replacement ewes takes skill, patience and time, and can be expensive.

Extra feed is required for May lambing ewes, when paddock feed is short. Lambing at that time also interferes with cropping operations.

Use of small mobs, and preparing paddocks for cropping using stock grazing pressure, can increase erosion risk on sandy soils.

Winter stocking rate of 1250 large frame ewes and cross bred lambs (approximately 4300 DSE) is 7.2 DSE/ha. This could be increased by a minimum 30% with a July lambing, but shearing time will need to be changed.

The good range of pastures provides an excellent opportunity to increase winter stocking rates, especially if confinement is used in a late break.

What could be implemented in the future?

I think integration is excellent, with use of stubbles and containment areas for livestock, plus having hay and grain on hand at all times.

Mobbing ewes up over summer (even using one large mob) and moving them every week will minimise erosion problems, and enable a good grazing pressure to be put on summer weeds. This system works very well if there are no maiden ewes, but a good water supply is essential. Stock camping is minimised, and stubble utilisation is improved.

Also, non arable sand hills could be fertilised to provide more feed in winter, along with use of sown cereals and strip grazing to make a winter feed wedge.

Wethers could be traded to provide more flexibility with livestock numbers, especially if lambing time is kept to May/June.
Planning for Succession

Case Study Ten - Ray, Gary, Dale Bald & families
Interviewed by: Mehdi Zaboli

Background

Ray Bald is a second generation farmer in the Ettrick area and runs a mixed farming enterprise with his two sons, Gary and Dale. In addition to cereal crops the enterprise has a large livestock component running 2500 breeding ewes.

Around 1620 ha of their property is sandy, 1620 ha is stony and 810 ha are loamy soils. Ray and his sons crop 4050 ha of their farm, the remainder being un-arable scrub. The average paddock size is 80 ha.

The business utilises 3 labour units who share the management and workings of the enterprise. Additional labour is sought for shearing only.

Sometime in the next few years Ray plans to hand the farming enterprise over to the next generation. Ray considers himself a conservative farmer who is open to new ideas.

Ray highlights the importance of having sufficient machinery to carry out the operations required on time. Maintenance and the associated reliability are also important. The hay baler is used for some contracting which provides additional cash flow.

Cropping

The Balds are on a two-year cereal crop and one-year pasture rotation. Crops following a pasture phase are sown with minimum-till (one working then sow). Second year crops are sown with no-till (one pass seeding with knife point). As a rule of thumb, no-till paddocks are sown last every year.

A Flexi Coil machine with knifepoints on 9 inch (23cm) row spacing is used to sow crops and cereal feed. A stoneroller and prickle chain is used behind the seeder.

A summer knockdown/herbicide is used to control potato weed and melons in paddocks going into crop. Onion weed is also a problem in some paddocks and 5g/ha Ally® (metsulfuron methyl) may be sprayed in crop or a spring spray-top in pastures. Broadstrike® (flumetsulam) is another group B herbicide used but only in pastures to control Capeweed and Branched broomrape in August.

Having stock allows the Balds to grow pasture which aids
Livestock

The Balds run 2500 Merino ewes, with 1200 mated to white Suffolk and 1300 mated to Merino as a self-replacing flock. 500 merino hoggets, in addition to 200 purchased ewes are used to replace cast for age (CFA) ewes and maintain the breeding flock.

Self-replacing Merino ewes are shorn first in March, others mated to White Suffolk are shorn in July, and Merino lambs are shorn in September.

Lambing takes place in April due to shorter pasture growing seasons. The earlier lambs are on the ground, the earlier they get fresh feed and the better the price will be at sale. This is vital as it optimises the income received from livestock.

The Balds do not target any particular sheep weight at sale although they do try to finish lambs as much as possible. Merino ewe lambs are kept and the older ewes, cross bred lambs and Merino wether lambs are sold during September. The aim is to sell all lambs by the end of September to avoid the “spring flush” when oversupply occurs and prices decrease.

T&R Pastoral abattoir in Murray Bridge has provided a good market for sheep meat with little freight cost and good feedback and Ray believes local farmers should take advantage of it.

The Balds find the high labour requirement to run sheep concerning. Operations such as crutching and hand feeding are very time consuming.

Grazing

Grazing takes place on 480 ha of rougher land that is regularly used as pasture paddocks, 810 ha of regenerating volunteer pasture and 20 ha of Salt bush. 2000ha of stubble is utilised after harvest and hand feeding also takes place with grain or hay.

Dry ewes and hoggets are run in 8 separate mobs (around 300 per mob) and stocked at 2 DSE/ha. Each mob will be rotated through 2-3 paddocks to give them fresh feed every 2-3 weeks up until April/May. The main trigger to rotate the grazing paddocks is soil cover.

Cereals are used for grazing on a large scale. 500ha are sown for grazing, with the intention of grain harvest and 400ha are sown for grazing with opportunity grain harvest. Cereal rye is the most desirable and commonly used dual purpose cereal, as it is considered more productive but barley and oats are also sown. Cereals for grazing are sown dry or early with 40kg/ha of DAP. To minimise erosion in some paddocks, cereal rye is sown to the sand hills and barley or oats on the heavier flats.

Balds may also look for agistment of their stock (normally hoggets) at certain times of the year. For instance in 2008 they agisted out 300 hoggets from May to August in a vineyard in Lobethal.

Water is not a problem as the source of water for sheep comes from bores, mains, and river water, although bore water is preferred as it is cheap. Troughs are assembled along the fence and there is only one trough per paddock.
What are the strengths of this system?
The Balds have adequate feed quantity available for almost 12 months of the year with small gaps and periods of lower quality being filled with supplements like hay, grain, straw and saltbush. Time of lambing matches this feed supply with young fast growing lambs having ad-lib access to green feed within 3-4 weeks of birth and definitely during the last 2-3 months of life.

Livestock turn-off in early spring ensures lambs are sold before grass seeds become a carcase quality issue; ewes get a chance to rebuild their condition before mating; and valuable summer feed is kept for the breeding flock. There is good attention to natural resource management and sustainability with stubble paddocks only being grazed for 2-3 weeks at a time over summer.

What are the possible challenges within this system?
A traditional Mallee sheep system that focuses on "per head" rather than "per winter grazed hectare" must achieve high reproduction and ewe replacement rates and maximise live weight sale per lamb and kilograms of wool per ewe. Hence, 500 ewe hoggets from 1300 ewes is okay and it's envisaged some cull ewe hoggets would be sold for meat; but perhaps a review and focus on the reproductive performance of the ewes and rams alike maybe of value.

The livestock issues of crutching times and time to provide hand feeding were identified. A review of the timing of the sheep operations maybe useful as there would appear to be labour conflict with critical cropping operations and periods of high labour demand. There is also low livestock labour efficiency in this business with one labour unit for 2500 ewes, but admittedly this is common in SA.

The multiple shearing dates lead to multiple crutching dates which leads to at least 2-3 of either the crutching or shearing times occurring at a conflicting time with cropping operations and availability of crutchers/shearers. Rationalisation to one shearing time and exploration of different crutching methods may help the labour efficiency.

The effort around supplementary feeding in late breaks during seeding maybe reduced by considering using "lick feeders" in the paddock. The "lick feeders" only require filling once or twice per week and tend not to have the ewes rush them as well as decreasing the amount of mis-mothering.

The cost of all the supplementary feed (such as hay, grazing cereal, grain and graze cereal, grain and saltbush) for the sheep enterprise could be higher than expected and should be calculated and costed against the sheep enterprise when compared to cropping gross margins.

What could be implemented in the future?
The "Sheep CRC – Merino vs Terminal Flock Model" could assist in evaluating the impact of various reproduction levels to returns. The increase in cereal root diseases in years of "volunteer pasture" should be quantified and costed to the sheep operation, but it maybe offset by the nitrogen and organic matter input.

The focus on "succession" is great and the planning can never start too soon. Succession is the biggest cost and most poorly managed decision on family farms. Family workshops are very important in identifying all participants interests, needs and aspirations, ensuring there is a wealth and asset creation plan, especially for when one family becomes three families on the farm, and most importantly the impending retirement is planned and funded and provides appropriate reward and satisfaction for the senior members.
Implementing Sustainable and Productive Forage System in the Mallee

The MLA Feed Demand calculator enables you to determine the total feed demand of all the livestock on your property, for each month of the year. You can then compare monthly livestock demand to the likely supply of pasture/stubble.

**Livestock**
- lambing from April onwards
- lambs weaned and sold in September
- 500 merino lambs kept as ewe replacements.

**Area of Feed Available for livestock**
- 810 ha regenerating medic pasture
- 20 ha saltbush
- 480 ha rough grazing land
- 690 ha cereals sown for grazing
- 2000 ha stubbles

**Pasture Production Rates**
- Regenerating medic pasture = 2250 kg/ha DM (June-October)
- Rough pasture = 1700 kg/ha DM (June-October)
- Cereals for grazing = 3600 kg/ha DM high quality feed (June to October).
- Stubbles = 2000 kg/ha DM (November to May)
- Saltbush = 900 kg/ha DM (March to May)

Using this tool will show you
- How much of your pasture your livestock are consuming.
- The size of your pasture shortage, or surplus, at various times of the year.
- How many kilograms of live-weight you produce per hectare.

The MLA Feed Demand calculator is based on CSIRO decision support tools GrazFeed and GrassGro. It is available free of charge from the MLA web site at [www.mla.com.au](http://www.mla.com.au), then navigate to the Feed Demand calculator on the right hand side of the screen.

**Bald’s Feed Demand Calculations**

By Tim Prance, Senior Consultant Pastures and Grazing Systems.

Pasture deficit, using freshly grown supply 225 tonnes/year
Pasture deficit, using supply with carryover 0 tonnes/year
Liveweight produced, cattle 0 tonnes
Liveweight produced per ha allocated to cattle 0 kg/ha/year
Liveweight produced, sheep 144 tonnes
Liveweight produced per ha allocated to sheep 75 kg/ha/year
Pasture demand as a % of pasture grown 33 %
There are two pasture curves in the Feed Demand Graph. The light green line shows the potential monthly supply of pasture and stubble (total tonnage of dry matter). The dark green line shows the monthly tonnage of pasture and stubbles, following grazing; assuming that only 2/3 of surplus feed is carried forward from the previous month (i.e. monthly supply less livestock demand with carryover).

The columns at the bottom show the total livestock demand for pasture in each month (i.e. what livestock are eating)

Livestock demand takes into account pasture/stubble quality i.e. the metabolisable energy levels.

Where the shaded bars exceed monthly pasture/stubble supply, additional livestock feed will be required. This may come from:
- Supplementary feed
- Increasing pasture growth (e.g. applying nitrogen fertiliser in winter)
- A forage crop.

Pasture demand % (in the key performance indicators) is the ratio of total annual demand of the livestock to the total annual supply of pasture.

**Interpretation**

On Bald’s farm, there is a freshly grown feed deficit in May before pasture/cereal feed kicks in, but no overall feed deficit, as carryover feed from stubbles and saltbush provides feed during May following lambing, and before cereals/pastures are available for grazing.

However, saltbush and stubbles are poor quality feed, especially for lactating ewes, so the ewes will require a high energy supplement such as grain. This either has to be provided as a supplement, or from unharvested grain/heads, or can be taken off the ewes “backs” as a reduction in ewe fat reserves.

The benefits are high price lambs in spring, with minimal stress on the ewes.

The downside is a considerable surplus of pasture/stubble during most months, as indicated by the low overall pasture demand of 33% of pasture grown.

The productivity of the enterprise is quite good, with 75 kg/ha live-weight meat produced per year.

The efficiency of Bald farm livestock enterprise may be improved, if more of the late winter pasture feed can be utilised – perhaps with a split lambing in say April and July.

Additional ewes lambing in July could be carried to both improve labour utilisation and pasture use. For these ewes, the focus will be on managing weaner lambs once paddock feed dries off and before stubbles are available.

**Summary**

The Feed demand calculator can be used to evaluate different scenarios, such as a split lambing and/or later lambing, and later weaning, along with evaluating the best way of filling the feed gap, especially in October/November.

This feed gap can be managed by:
- Using a standing cereal crop
- Sowing lucerne as part of a cropping rotation
- Using efficient winter grazing to carry surplus winter feed forward into late spring

The Feed Demand calculator will show where potential feed shortages occur with a higher number of ewes, and how many tonnes of pasture feed will be required each month for each class of stock. Appropriate risk management strategies can then be put into place.
Cropping and sheep co-exist without pastures

Case Study Eleven - Jeff, Esma and Todd Niejalke
Interviewed by: Tim France

Background

Jeff and Todd farm just out of the Pinnaroo Township with an average rainfall of 310 mm and 210 mm average in the growing season. The soils are mostly loams and clay loams, with a small amount of sand. Property size is 1400 ha with another 200 ha leased, all arable.

Jeff and Todd run an intensive cropping farm with 2 permanent family labour units and extra casual labour at shearing time. Their main focus is on timeliness and care with all aspects of cropping activities. Crop monitoring is crucial.

The livestock are a small part of their farming operation and are managed so they do not compete with cropping for labour or land. Pasture area is zero to keep weeds under control, especially ryegrass. In winter livestock graze sown crops and in summer they are run on stubbles. To maximise returns all offspring are sold as heavy lambs in winter. Maintaining good soil condition and ground cover is considered paramount.

Cropping

A typical rotation is wheat, wheat and barley, followed by two years of break crops such as canola and lupins, or vetch and triticale. They have stopped growing peas due to frost susceptibility.

Following a poor season, recovery is hastened by keeping up inputs of fertiliser and chemicals to a reasonable level.

The property is 100% no-till with knife points on 11 inch (27 cm) row spacing and press wheels. Seed and fertiliser are sown through separate boots using a Horward Bagshaw Scaribar.

For cropping preparation, paddocks are sprayed with a knockdown herbicide before sowing. Sulfonyle urea herbicides are rarely used, and if used will only be Ally® (metsulfuron methyl).

Summer weed control is considered very important. Summer weeds are knocked out as soon as they appear. Two summer sprays are applied if necessary particularly targeting caltrop control.

The main weed of concern is annual ryegrass. Jeff and Todd have been focused on the control of annual ryegrass for 10 years. Lupins and canola offer an opportunity for ryegrass control using alternative chemicals. They are worried that ryegrass will get out of control if oats are sown for sheep feed, as oats have herbicide selection limitations; therefore triticale, canola and vetch are sown instead.

The cropping issues of most concern are input costs to purchase fertiliser, chemicals and machinery. In the future, Jeff and Todd see cropping as being more precision orientated using auto steer and yield mapping. They are interested in the possibility of sharing or syndication for cropping equipment. In addition, all cropping inputs will be carefully monitored.

Location: Pinnaroo
Total Area: 1600 ha
Annual Rainfall: 310 mm
April-Oct Rainfall: 210 mm
Main focus of enterprise: Cropping 90%
Livestock 10%
They have an open mind regarding livestock in the future, but for the medium term Jeff and Todd are focusing more on cropping.

**Livestock**

The Niejalkes run a small mob of 350 Merino ewes mated to Merino rams, with lambs dropping in August. All lambs are weaned onto stubbles. Once the split grain has been eaten from the stubbles, all the lambs (ewes and wethers) are put into their own sheep feed lot, and sold in June at 18-20 kg dressed weight. Cull ewes are sold following shearing in July.

During summer, stubbles are grazed lightly. There is one mob of ewes and one mob of lambs in summer that are shifted every two weeks. Stubble weeds are not considered important stock feed and are sprayed out as soon as they appear. Lupins are not grazed at all, due to sandy soils and lack of ground cover.

Ground cover is carefully watched and stock are moved into the confinement feeding area if soil cover is compromised. Sheep will remain in the confinement area until there is sufficient paddock feed for them to graze. Lambs will stay in feed lot until sold.

Often smaller paddocks are sown for sheep feed, so they are rotationally grazed over winter. Ewes graze 150 ha triticale and vetch which can be sown dry if rain is late. Recently they have added some canola into the grazing mix which is sown with 20 kg/ha DAP fertiliser at seeding. 10 ha saltbush is also utilised.

As there are no pasture paddocks, there is no need to winter clean, spray-graze or spray-top any pasture paddocks. Any grassy weeds in paddocks sown for stock feed are spray-topped in spring.

Hay is made if there is surplus paddock feed. Jeff and Todd have spray-topped a canola crop with 800ml/ha glyphosate (450g/L), then cut for hay 1-2 days later. This worked out very well and will be done again, especially if there are grassy weeds in the crop. The canola wasn't conditioned but may improve the result next time.

Ongoing livestock issues include competition with cropping timeliness, the adverse impact sheep have on soil (compaction in winter and erosion in autumn) and weeds.

**Key Messages**

- Timeliness and good weed control contribute to successful cropping
- Livestock are a small part of the business and care is taken to ensure there is no conflict with cropping operations
- Keep up with technology and new practices through reading and Mallee Sustainable Farming group activities
- Avoid grazing lupin stubbles to prevent erosion on sandy soils.

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By Bruce Hancock - Senior Livestock Consultant
Rural Solutions SA

**What are the strengths of this system?**
The later August lambing matches feed supply with animal demand and ensures lambs are produced with a low cost of production and are ready for turn-off when $/kg is expected to be at its highest. The winter feedlot is okay in this region with the drier, sandy and warm conditions. The sheep enterprise doesn’t compete with the cropping program’s timeliness due to the small number of head and the timing of the major sheep operations.

Even though small in number, this productive sheep enterprise would pay for a fulltime, live at home, family labour unit without compromising crop production.

**What are the challenges within this system?**
Selling cull ewes in July after having reared a lamb in the previous year and only grown wool for 6-7 months would be a bit unproductive. Each one of these cull ewes could be better replaced with a pregnant ewe.

Cost of sown feed could be as high as $35/ewe (150 ha @ $75/ha = $11,250 ÷ 350 ewes = $32/ewe) and might reduce profit margin.

This is a merino meat enterprise and there are significant financial gains to be had from buying rams that are objectively known to grow faster and larger and with more muscle and have good reproduction rates in their daughters – how are the rams purchased?

**What could be implemented in the future?**
It’s understandable that the sale of cull ewes in July, after shearing is simple and uncomplicated and is often when mutton prices are likely to be higher, but its the opportunity cost of carrying a dry ewe instead of a pregnant ewe that would give you a lamb in the next month. Perhaps the ewes could be identified at weaning, shorn and sold 4-6 weeks later.

Just a few more replacement ewes would need to be purchased in the spring /early summer – a time when feed is abundant. Alternatively, perhaps an alliance could be formed with another producer to supply mated ewes in autumn.

A day in the office on sheep gross margins with a focus on the cost of the sown feed may prove interesting and insightful.
Implementing Sustainable and Productive Forage System in the Mallee

Cropping according to soil types

**Case Study Twelve** - Glynn & Janelle, David & Leah and Anthony & Melissa Schmidt

Interviewed by: Mehdi Zaboli

**Background**

**Glynn and sons David and Anthony Schmidt farm with their wives, south east of Waikerie. The farm has 9000 ha arable land and a further 150 ha non arable land that is generally used for grazing. The remaining 600 ha is scrub which can be used in dry times for extra feed.**

The farm operates on 3 labour units with casual labour employed for shearing and occasionally for seeding. The business also makes use of Anthony’s mechanical background.

In the future Glynn plans to continue working on the farm but with less intensity. Over the next ten years they will continue to monitor the returns for grain and livestock. If the returns are good enough they will look to employ casual labour and will continue to upgrade machinery with new technologies. This will be a major focus in a good year and when there is good second hand machinery available.

**Cropping**

The Schmidts no-till around 6000 ha of land using a Case Concord with knife points at 12 inch (30cm) spacings and press wheels. Minimum tillage is used to sow in stonier paddocks where rhizoctonia is a problem. An older seeder is used in the stony areas to prevent too much damage to the air seeder.

The cropping rotation is based loosely on soil types. The Schmidts continuously crop their loamy soils using a rotation of wheat, wheat, wheat, barley or triticale then pasture. In the fourth year the light sandy soils are sown to barley and triticale for grazing with opportunistic grain harvest.

The stonier soils are not cropped as intensely and are worked in a two year rotation of crop, generally wheat and then pasture.

**At a Glance**

**Location:** Waikerie  
**Total Area:** 9150 ha  
**Annual Rainfall:** 260 mm  
**April-Oct Rainfall:** 160 mm  
**Main focus of enterprise:** Cropping 80%  
Livestock 20%  

About 3000 ha fits into this category and is run on a two-year rotation due to minimal rainfall and restrictive soil type.

Summer weed control strategies generally depend on rainfall. Control is generally achieved with a mix of glyphosate and Surpass® (2,4-D amine) and grazing. In certain areas of the property a 35ft blade plough is used especially in large infestations of onion weed as it is a cheaper option for weed control. The blade plough works most efficiently when the soil is dry.

As long as there is rain, cropping paddocks are sprayed with
a knockdown herbicide prior to sowing. The stonier soils are cultivated 1-2 weeks before sowing to control rhizoctonia levels.

Sulfonyl urea herbicides may be used over 25-30% of cropped paddocks depending on weed populations and paddock. Logran® (triasulfuron) at 18-20g/ha is most commonly used.

In light of the recent run of poor seasons, the Schmidts have put in place several practices to ensure they hasten their recovery after a dry spell. Firstly they always sow their lighter soils first and they also place great importance on financial planning to ensure they can cover their expenses in a bad year. Finally they will put extra crop in following a poor year to try to recover some costs.

Cropping issues include increasing fuel, fertiliser and machinery costs. Glynn also noted that you have to be in a really good position to upgrade machinery, which is difficult to maintain after a long run of dry seasons.

Other issues include chemical resistance (group B resistance already occurring in Waikerie), climate change that will start to discourage farmers in marginal areas, and a reduction in time and money invested into Research and Development.

Livestock

Livestock consist of 1200 Merinos. 200 are mated to crossbred rams for prime lambs; 600-700 are self replacing, and there are also 250 hoggets. Sheep are kept in 6 mobs with an average size of 250-350. Salt bush is often utilised before the season break and before stock enter stubble paddocks. Monitoring takes place to ensure paddocks are not grazed too heavily.

During summer, sheep survive on stubble paddocks. If summer rain and available feed are adequate the Schmidts may look at agisting in 1000 mixed age sheep for a couple of months. Traditionally summer weeds are sprayed and then grazed.

Lambing occurs in March, with good paddocks kept for the pregnant ewes. There is a risk with lambing in early autumn if a heat wave occurs.

In the event of an early break, triticale will be sown early for weaning lambs. Alternatively with a late break, the amount of sown feed will be reduced and supplementary feeding will take place with hay and grain. A few small paddocks closer to the house may be sown with triticale. This feed can then be used for finishing the lambs, enabling stronger grazing pressure and easier stock handling.

Lambs are shorn in late August while the rest of the flock is shorn at the end of July. Most of the lambs are sold at the end of August after shearing, while heavier lambs will go earlier. Target sale weight is a minimum of 40kg live weight.

Winter grazing management consists of rotating paddocks and maybe some hand feeding. Paddocks that will be cropped the following year are spray-grazed for turnip in August before the seeds set. If there is excess feed availability, this is used to ensure that the lambs are in top condition. Generally speaking there is not much feed available during winter.

If a dry spring is experienced, confinement feeding is used to finish the lambs, as the family avoids hand feeding if possible. If a mob can not be finished in the paddock they will be finished after shearing in a confinement lot. Hay, oats and triticale are used depending on what is on hand.

In general the aim is to be understocked to minimise labour and let the sheep take care of themselves.

The Schmidts face several issues in regards to livestock. Of concern are the changes that will need to be implemented when mulesing is phased out; the effects of the Federal government’s carbon trading scheme; and the decrease in availability of shearers.
What are the strengths of this system?
The Schmidts run an extensive, low input livestock system, along with a relatively intensive cropping operation which helps to manage the risk in this very low and variable rainfall environment. In this system, sheep are not competing with cropping for labour at critical times, which is the reason for early lambing and late winter shearing, with minimal hand feeding.

Lambs are sold early before any grass seeds are a problem, and whilst prices are higher.

Pastures are winter cleaned for weed control, which is made possible by the low winter stocking rate of about 1 DSE/ha.

Trading stock provides extra flexibility when there is adequate feed.

What are the possible challenges within this system?
Rhizoctonia control is obviously a big problem and the Schmidts will need to continue to explore all practical options, whether it is a rotation with perhaps more oats or cereal rye, changes to seed delivery system, nutrition or any new findings with possible seed dressings.

Is onion weed only becoming a problem in pasture paddocks? It should be controllable under a continuous cropping system however problems arise when paddocks can’t be cropped every year for different reasons.

Herbicide resistance is on the rise and rotation of herbicide groups is required to minimise resistance potential. This can be difficult with some herbicides, particularly group B’s as they are low cost and therefore low risk in terms of inputs.

What could be implemented in the future?
Whilst there is plenty of potential to make the livestock on this farm work harder, and become more profitable, there is no point in doing this, unless extra labour is made available for this purpose.

It would appear that farm resources are better put into rhizoctonia control and minimising cultivation.
Strategies to suit production challenges

Case Study Thirteen - Peter, Hannah & Don Loller
Interviewed by: Linden Masters

Background

Peter and his wife Hannah, farm north east of Karoonda in a partnership with Peter’s father Don. Don’s father Ken first moved to the Lowaldie farm in 1948 and the business has recently transitioned from Don and wife Dorothy to the current partnership.

The farm has 30% red flats, 40% sandy loams, 30% deep sands. It is a mixed cropping and Merino sheep enterprise. The reliable income from stock helps to spread the risk, assist cash flow, and enables income to be generated from frosted crops, seed screenings and low priced grain.

Involvement with the Sheep ‘Bestprac’ group, run through Rural Directions, and with the Mallee Sustainable Farming group, have provided a good exposure to new ideas for the business. The new CSIRO trial site on the farm is an exciting project to be involved with.

The Loller’s staged approach to succession has been successful in giving all family members security moving forward. Don contributes his experience and seasonal labour and Peter and Hannah can make decisions knowing they will not impact on Don and Dorothy’s future wealth. Careful planning and evaluation of enterprises is essential in deciding how to grow the business into the future.

The Loller’s would like to trial electric fencing for grazing management and complete the transition to a no till cropping system.

Cropping

Currently there is no set cropping rotation on the property. Rotations are subject to soil type and capability. 400 ha is continuously cropped with other paddocks subjected to either a 1:2 or 1:3 cropping to grazing ratio and last year around 300ha of rye was sown for grazing.

Seeding is moving towards 100% no-till using a Forward Farming air-seeder with a John Deere chisel plough with Agmore boots at 9 inch (23cm) spacings, narrow points and press wheels. Crops are typically sown with 60 kg/ha of 24:16 fertiliser. There will be a focus over the next few years in looking at rotations and varieties to help establish a rotation schedule for their paddocks.
Strategies for grass weed control include spray-topping in pastures and double knock in crop. Trifluralin is also used and still seems to be working well. The use of sulfonyl urea herbicides is limited to Ally® (metsulfuron-methyl) in a crop situation and perhaps one paddock of Logran® (triasulfuron) when needed.

Frosts are managed by sowing barley first and if a crop is severely affected in spring, it is cut and baled for hay. They believe they could improve production through upgrades to seeding equipment but have been unwilling to make these large purchases due to a run of poor seasons.

Livestock

The Lollers run a self replacing Merino flock with 1150 Merino ewes, 1230 lambs, 370 hoggets and 40 rams. Lambing occurs in June/July. This strategy was trialled after closing the stud and found to be successful. Lambs are dropped onto green feed eliminating the need for supplementary feeding over summer and during seeding. It is hoped that later lambing will also improve the tensile strength, by having better nutrition at the time of lambing. Lambing in June/July has also enabled the Lollers to improve lambing percentages.

Shearing originally occurred in October but will be changed to March primarily due to June/July lambing. By shearing closer to the time of lambing, the point of break in the fleece should be high in the tip. It also enables the entire flock to be shorn at the same time of year. This enables lice control to be implemented over all sheep on the property at once, increasing the likelihood of success.

Confinement feeding has been used to finish trade lambs which are sold at 24kg dressed weight in February. Feed mixes used in the feedlot include an 85:15 barley:lupin mix, plus hay and straw.

In the last two seasons the Lollers have moved to planting cereal rye for feed. Cereal rye is planted at the break of season and grazed from July until November. They are keen to continue this strategy as it has eliminated a lot of supplementary feeding and the labour that it entails.

Grazing

The Lollers 1150 ewes are run in 5 mobs. Grazing is managed by a visual assessment of stubble and ground cover while grazing.

Stock are used to clean up stubbles and help with weed management. When there are good summer rains, melons are sprayed with low volatile ester to sweeten, and then grazed.

When summer ground cover is low, sheep are either shifted to another paddock or confinement fed.

Winter pastures are grazed quickly for a short period of time, once they start lambing livestock are not moved until after lamb marking. Stock may be supplemented with barley or hay if needed.

Confinement feeding has been a valuable tool to help the Lollers manage seasonal variability. Since its establishment they have never had to drop sheep numbers in a poor season and hence they can hit the ground running when conditions improve. When it has been necessary to use the containment area, it helped to improve ram contact at joining which resulted in over 100% lambing in maiden ewes.

Using confinement feeding comes at a cost in terms of feed and labour, but as they have been able to maintain quality sheep and a good lambing percentage, it has paid good dividends. The feeding cost is approximately $1/head/week.
What are the strengths of this system?
The main strength is a balanced diversity between cropping and livestock enterprises and I suggest a passion for Merino sheep. Maintaining ground cover is again a major business driver and minimum till technology is used to achieve cover targets and reduce cropping costs. Animals are also taken off paddocks and placed in confinement areas which helps the pasture get away at the break. Later lambing further assists with this technique. Confinement feeding is utilised if stubbles reach a critical cover level and it would be good to know more specifically what this is (DM level, % cover) and how it is assessed. Similarly for autumn/winter pasture stocking decisions.

High reproduction rates of 100% and more for lambs weaned from ewes mated including maidens, indicate good nutrition and management practices.

Lollers are not afraid to graze crops if necessary. Grain and Graze workshops have been conducted that have addressed the pros and cons of grazing cereal crops. Information is readily available on the Grain and Graze website.

The continual evaluations of the season, making decisions early and looking at alternatives such as feeding or seeking agistment, are critical success factors.

What are the possible challenges within this system?
Changing to later lambing has helped with pressures from dry seasons in autumn and it is cheaper to feed weaners over summer than lambing ewes. However good nutrition of the later lambs over the summer period is essential and supplementation, or grazing standing crops could be alternatives worth considering, along with confinement feeding. Monitor weaner numbers and weights every 4 weeks over summer and autumn to ensure they reach winter weight targets.

What could be implemented in the future?
Consider at some stage trading in livestock if labour becomes an identified issue. Trading in sheep though does require good biosecurity systems to avoid importing in weeds or drench resistant worms. Perhaps trading of cattle weaners / yearlings might be an option as they are softer on the sandy country.

My impression however is the Lollers are passionate about their sheep and their lifetime’s work with sheep breeding.

Consideration could be given to using pregnancy scanning to identify twin and single bearing ewes routinely vs. the current irregular use, which will allow better decisions and nutritional management of dry, single and multiple bearing ewes. A cost benefit is needed.

Also it’s important to evaluate the costs to benefit ratio of using containment feeding for the production feeding of lambs. Clearly the animal health and management requirements of confinement feeding have been worked out and all that needs to be considered is the use of a production ration.
Moving Cattle out of the System

Case Study Fourteen - Peter and Faye Frahn
Interviewed by: Mehdi Zaboli

Background

The Frahn’s property is located on the eastern side of the River Murray, at Mannum. The property has 1700 ha arable with 40% sand, 20% loam, 40% sand over clay soils. Around 250 ha is scrub.

They utilise 2.5 labour units and employ no casual labour. Up until 2009, they ran a 60:40 cropping/livestock mix with the livestock component consisting of 120 head of cattle.

This season they have decided to drop the cattle component of their business to focus on cropping. This decision was made for several reasons. Firstly they believe that the future carbon emissions trading scheme will make life a lot harder for cattle producers, and secondly they have been unable to achieve the returns they need for farming cattle.

Peter’s main interest lies in continuous cropping and they will aim to purchase a new harvester in the coming year. There is no immediate interest in bringing back the cattle in the next five to ten years, but this option will be reviewed closer to retirement. Spending more time with their young family is the priority at the moment.

A challenge of the 100% cropping system will be reduced cash flow throughout the year and highlights the need for good budgeting from one harvest to the next.

Cropping

In past years a typical rotation has been barley (under sown with medic), pasture, wheat or triticale, pasture, barley, and oats.

Looking solely at the cropped paddocks, 50% were always sown to barley, 25% wheat, 20% triticale and 5% left for oaten hay. If the paddock was stony it would be sown for hay, and if sandy it would likely be sown with triticale. To minimise soil erosion risks, sandy paddocks are never cut for hay.

At a Glance

Location: Mannum
Total Area: 1950 ha
Annual Rainfall: 350 mm
April-Oct Rainfall: 300 mm
Main focus of enterprise: Cropping 100% in 2009
Cropping is 100 % no-till. Peter and Faye sow using a Flexicoil bar with narrow points and press wheels. They sow on 9 inch (22.5cm) spacings with a split system of seed and fertilizer using a Morris air seeder bin.

Major summer weeds (melons, potato weeds and roly-poly) are sprayed after harvest using 450 g/L glyphosate + LV Ester 680® (2, 4-D ester) + Garlon® (triclopyr). Cattle have also been used to maintain grazing pressure on weeds, and in their absence more chemical use will be required.

Sulfonyl urea herbicides are avoided; however Broadstrike® (flumetsulam) a group B herbicide that is safe on medics has been used in the pasture phase when weeds are still relatively small.

In the past each paddock was sown to pasture every 6 years. 200ha was sown to a medic and cereal mix purely for grazing, generally consisting of 50-60kg/ha oats and 5-6kg/ha medic plus 100kg/ha of floor swept fertiliser.

Paddocks with high brome grass populations were winter cleaned in June with a grass selective herbicide and spray-topping was implemented as required.

Livestock

The Frahn’s used to sell stock to earn extra cash around June/July but have decided not to proceed with cattle in 2009. In the past, 850ha pasture has been left to naturally regenerate every year for their stock.

The livestock herd consisted of 120 heifers and 2-3 bulls. Peter and Faye bred their own stock and calved from 100 heifers each year around June. They sold 80 -100 calves annually, as well as 20 culls. Traditionally one new bull was brought into the system every year around late winter/early spring. Bulls are introduced to the herd in September and taken out in December. Livestock were grazed on stubbles over the summer.

If cattle were in good condition, they were sent to market in April. If they seemed to be lacking, they were fed additional hay, generally receiving 40-50 tonnes over 6 weeks to fatten up for sale. Target weight for sale was 250-260kg live weight (180-200kg on the hook).

Grazing

In summer, cattle were split into 3 mobs of 30-40 head. River water was supplied to 4500L cattle troughs.

In the event of high summer rainfall and/or melon problems, all cattle were kept in one mob to maintain grazing pressure and maintain low summer weed levels.

In dry summers, cattle remained on stubbles and were supplementary fed with 2 bales/ 40 cattle/ week. Supplementary feeding would begin when soil cover reached 30-40% and stubbles were around 15-20 cm high. The practice of not cutting hay in sandy paddocks was also implemented to prevent erosion.

Every autumn 250 ha of feed was sown by the end of March, with grazing taking place at 7-10 day intervals. Paddocks sown for feed were also used for calving in
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June. Special care was always taken not to overgraze the young medic plants while the pasture was establishing.

In the event of a late break, hay may have been purchased or 20 steers sold off.

Low feed availability during spring resulted in sacrificing a cropping paddock (barley or triticale) but even in dry years there was generally enough spare feed in regenerating pastures. An example of this was in September 2007 where Peter decided to move cattle onto a crop of triticale for extra feed.

By Tim Prance – Senior Consultant, Pastures and Grazing Systems
Rural Solutions SA

What are the strengths of this system?
Labour saving! By only focussing on cropping has freed up time to spend with family. Peter is also focussing on something he enjoys. Farming is a business, and there is little to be gained by trying to maintain enterprises that you don't enjoy running.
Continuous cropping may also enable enough cash flow to be generated to purchase modern, up to date machinery, with a relatively small arable area.
Ground cover will be able to be maintained with minimal erosion risk.

What are the challenges within this system?
The weed control benefits of cattle during summer won't be there, once the property is 100% cropping, so there may be an increased reliance on chemical herbicides. However, if summer weeds are sprayed very early, this should not be a problem.

Previously, a pasture was sown every six years. With the new system there won't be a pasture break crop for nitrogen build up, or for grassy weed control. Therefore, the cropping rotation will have to be flexible enough to enable weed control as required, especially brome grass. This may mean including high risk break crops such as canola, hay crops and/or crop-topping weedy patches.
Regular and thorough attention to weed monitoring in crops will be essential.

What could be implemented in the future?
The original livestock system seems pretty sound, with attention to time of calving and grazing management. The only downside might have been 250 kg sale weights in April, which would suggest calves are loosing (or not gaining) weight during summer. With a later calving (or lambing), it becomes more important to keep animals growing in summer than with autumn calving. The feed quality emphasis also changes from focussing on early lactating cows in autumn, to focussing on weaner calves during summer. For this purpose, lucerne and/or standing crops may be useful; an on farm feedlot; or selling all young animals early as stores.
Quality focus on sheep meat production

Case Study Fifteen - Richard and Penny Howard
Interviewed by: Tim Prance

Background

The Howard’s run a well thought out, integrated livestock/cropping operation. The timing of their livestock operations fits in with cropping, and they make good use of a non-cropping lease block.

The farm soil is one third loam and one third sand over clay soils, with the remaining one third split between sand hills and stony patches.

Their farming system has been set up in such a way that there is still room for future productivity improvements. Clay spreading, recently established lucerne, and cereals sown for grazing may be implemented further in the future.

Currently the Howards run a 60:40 cropping livestock mix, but they may move to a 50:50 mix in the future. Running sheep provides cash flow in winter/spring and is a good risk management tool as there is always income from meat and wool. The farm employs 2.5 permanent labour units, plus casual labour used for shearing, crutching and lamb marking.

They are happy with the current scale of farming operations. Their young family is unsure of their future intentions, so the next investments may well be off-farm, to give flexibility and options in farm succession and retirement.

Cropping

2100 ha is continuously cropped; including the 500ha sown to sheep feed. The remaining 700 ha leased land is rarely cropped.

Since 2000, the property has been 100% no-till, using one pass seeding with knife points. Seeding is on 9 inch (23 cm) row spacing with press wheels. Seed and fertiliser are sown through the same boot.

A typical rotation on the heavier soils is wheat, wheat, barley, followed by canola or pure vetch or oaten hay. This rotation is assessed annually and may change depending on weed pressure and seasonal conditions at seeding. Sown sheep feed consists of the following options: barley and vetch; oats and vetch; or a small area of cereal rye and vetch. Some of the lighter soils are continuously cropped to lupins or wheat in alternate years.

For cropping preparation, paddocks are sprayed with a knockdown herbicide before sowing. Sulfonyl urea (SU) herbicides are used sparingly to prevent resistance development. Logran® (triasulfuron) will be used when required. Summer weeds are sprayed with glyphosate as soon as they appear, followed by grazing with sheep. There are no uncontrollable or yield limiting weed problems on the farm at this stage.

At a Glance

Location: Geranium
Total Area: 2800ha + 700ha leased
Total Annual Rainfall: 400 mm
April-Oct Rainfall: 300 mm
Main focus of enterprise: 60% Crop
40% Livestock

Richard in a wheat crop growing in a recently clayed paddock.
Crops are usually sown with 80 kg/ha 24:16 fertiliser, with 20L/ha liquid UAN applied following emergence. There has been no recent soil testing, and fertiliser type and rates are based on crop removal the previous year.

Frost risk is managed by varying sowing time and varieties. The same variety is not sown on the same farm at the same time. Clay spreading has also helped. They also have on farm storage of up to 1000t of grain which provides grain marketing flexibility.

The cropping issue of most concern is the unreliability of growing season rainfall, especially in recent poor springs.

**Livestock**

Livestock are considered a key part of the farming enterprise. 1300 Merino ewes are mated to lamb mid April (before cropping season). 1000 ewes are mated to Merino rams, with some wether lambs sold in October and the remainder are put into their own on-farm feedlot for sale in autumn/early winter. The other 300 Merino ewes are mated to White Suffolk rams. Shearing occurs in late July and there are plenty of fence shelter belts for inclement weather.

Cross bred lambs are either sold as suckers in October at 16-18kg, or put into the on-farm confinement lot, for sale the following autumn at 22-23kg heavy lambs. Lambs will ideally be in the feedlot for a maximum of 45 days, any longer and the process is unprofitable. All Merino ewe lambs are kept as hoggets, to replace cull Merino ewes.

The Howards also trade wethers and ewes. They are usually purchased in October and graze excess feed and stubbles, and are later put through the confinement lot. Ewes are often mated and sold before lambing.

This season, the 500ha of sown feed has enabled the purchase of 370 scanned, in lamb, mated ewes which started lambing on the 1st of August. This has enabled a more profitable use of the sown pastures.

**Grazing**

During summer, only ewes and hoggets graze stubbles. There are five mobs of ewes and one mob of hoggets with around 250 ewes per mob. They are moved every fortnight around stubbles and assist with summer weed control. Ewes remain on stubbles until ground cover starts to disappear on sandy rises.

The ewes are left on stubbles for as long as possible, then just before lambing (early April) all ewes are moved to the 700 ha lease block. Pastures on this block consist of weeds, sub clover, medics, perennial veldt grass and evening primrose. This block can have up to 5 months rest over summer and with summer rains the perennials can accumulate over 1500 kg DM/ha FOO (Food On Offer), an exceptional feed-bank or standing haystack. Later in autumn (late pregnancy), barley is fed to ewes. All paddocks are watered by troughs. There is no electric fencing.

All ewes lamb on the lease block in 250 ewe mobs, and stay there until tailing (late June). All are then moved back to the home block to graze on earlier dry sown cereals. Sowing cereals for livestock feed occurs as early as possible, as early as February in some years. Richard will start sowing livestock feed on 25mm late summer rainfall.

Ewes and lambs continue to graze cereals until weaning in early October, when the ewes move back to the lease block until stubbles are ready.

Lambs remain on the sown cereals until sold in October, or are moved into the confinement lot. This ensures lambs are free of grass seeds (silver grass, brome and barley grass) which are big problems in the district.

500 ha of cereals are sown for grazing. The remaining land is sown as a crop to ensure good weed control for subsequent crops and for weaner lambs. To prepare for sowing paddocks are sprayed with a knockdown and later trifluralin, and then fertilised at seeding. These paddocks are also spray-topped in spring if grassy weeds such as brome grass are present.

There is also 120 ha lucerne that was sown in 2008.
By Bruce Hancock - Senior Livestock Consultant
Rural Solutions SA

What are the strengths of this system?
Richard and Penny ensure all arable land is cropped each year and focus on reducing weed seed set. Crop selection and rotation is according to land class and capability and grain is stored for timely marketing or value adding through the feedlot.

The sheep meat production is quality focused with high attention to the elimination of grass seed infestation in the lamb carcase. The sheep enterprise doesn’t compete with cropping timeliness, except for autumn lambing in late breaking seasons, but the feed bank developed on the grazing block would help in these seasons. The trading in ewes and wethers assist in the utilisation of spring feed and stubble management in preparation for seeding.

What are the challenges within this system?
The cost of fodder for the sheep (ewes) would appear high if no grain or hay is sold from the 500 ha sown as sheep feed, and there is no benefit apportioned to the following crop or the livestock trading or lamb finishing. So on face value, the 500 ha of sown feed @ $75/ha = $37,500 ÷ 1300 ewes = $29/ewe, plus the leased grazing block might mean fodder is costing around $45/ewe (These figures are based on the core flock and not on the recent addition of the 370 mated ewes that were bought as part of the Howard’s practice of opportunity buying/trading of sheep when seasonal conditions permit).

What could be implemented in the future?
The agronomic and livestock production systems appear to be very well tuned, so perhaps the only option for improvement might come from sharpening the pencil and calculator in the office and calculating the sheep gross margin with a strong focus on the cost of fodder. While at it, a gross margin on the lamb finishing enterprise and livestock trading would be useful.

While in the office and focused on cost of production, it is important to expend the effort and energy on costs that will improve productivity and not the costs that are non-negotiable if you are in sheep, i.e. selling costs.
Background

The Morrell family have farmed just out of Bowhill for a hundred years. The 4200 ha farm is currently run by the fourth generation, Ashley and Kingsley with help from their father Owen. Owen believes the biggest advancement he has seen in his lifetime is the adoption of 100% no-till on the farm.

Their home block consists of 2200 ha, 200 ha of which is non-arable scrub. They also have a further 2000 ha of land closer to Wynarka. 80% of the soils on the home block are a sandy loam and the other 20% are limestone ridges. The second block is predominately sandy loams that have a grittier texture.

The Morrell’s main enterprise is cropping and they also run Merino sheep. When they have access to water from the Murray River, potatoes are also grown.

The farm operates with 3 full time labour units and casual labour is sourced for shearing.

Ashley notes that one of the keys to their viability is that they are willing to source and accept advice from a range of advisors. Several years ago one of these advisors mentioned the idea of keeping a diary of all farm activities including spray applications, cropping dates etc. Ashley now has a record of exactly what happened on their property for the last 9 years. This system has proved invaluable to track changes in practices especially with the implementation of no-till.

Cropping

Paddocks are assessed annually for any problems that may warrant changing the rotation but generally the Morrells work on a wheat, wheat, barley or a wheat, barley rotation. They specifically avoid putting barley on barley as they find that they end up with too many leaf disease problems. Small paddocks of oats are sown close to the feedlot for hay and grain. Some of these paddocks are also more prone to frost.

The Morrells are currently looking at introducing canola or a legume into their rotation to enable better weed and disease control. They are hesitant about making this change, as they are not confident that canola will provide the same returns as wheat or barley, but are willing to make the sacrifice to improve the whole system. In the past they have trialled new practices first on only one paddock to determine viability. In the case of the paddock that was first trialled for continuous cropping, they have noticed a consistent improvement every year.

Summer weed control is applied 2-3 weeks after harvest using either Powermax® (glyphosate) or Garlon® (triclopyr) to control innocent weed, ‘fuzzy grass’, and melons. They used to apply...
summer control between February and March but found the melons were getting too big to be controlled effectively. In the year prior to cropping, each paddock is assessed for weed control. The level of weed control will determine which crop will be sown.

They continuously crop most of their cereals with a Flexicoil® air-seeder towing a 5T Shearer box. The system is single shoot with Tungsten knifepoints and press wheels on 9 inch (23cm) row spacing. Soil tests have been taken on the property and fertiliser rates applied to replace nutrients lost in the harvest of the previous crop.

Sulfonyl urea herbicides (mainly Logran®) are used on the property but are slowly being reduced due to the observations of residual effects developing, especially in the last few dry years.

Their biggest issues are the lack of finishing rains in recent years. Ashley also noted that the inclusion of no-till has greatly decreased the effect of the wind erosion problems that they have previously experienced.

**Livestock**

800 Merino breeders are run at the Wynarka property, 500 Merinos are run on the home property for crossbred production and a further 300 Merino hoggets are kept as replacements for the Merino breeders. Merino ewe hoggets are culled at 1.5 years, however the best are kept and used for merino breeding for two years (between 2.5 and 3.5 years). Some ewes are culled again at 3.5 years, the best of which are moved to the other block for cross breeding.

Genetics are prioritised for big-framed sheep with wool quality a secondary concern. Generally the aim is for 21 microns.

Lambing occurs in early March, which can be a problem if a late heat wave is experienced. 25-30% of the flock are maiden ewes and in the event of hot weather some of these ewes tend to drop their lambs at the water troughs. Changing lambing time to increase survival has been considered but they are happy with their survival rate and the livestock season fits well with the major cropping component. Lambs can be marked before seeding, later weaned and put straight into the confinement area before shearing in July.

The confinement feedlot is new this year and feed rates are still being analysed. The sheep are shut into the lot between July and August to give the sown and regenerating pastures time to increase their feed on offer. Stock may be returned to the lot around October if the feed is not available in the paddocks.

Sheep will be supplementary fed in the paddock before being put into the lot to get them used to the feed, mainly oats and hay fed on alternate days. Hoggets will spend around 2.5 months in the lot, while the ewes will be put in just after shearing for 6-8 weeks. Lambs are not put in with the ewes as there is evidence to suggest they don’t survive well in those conditions hence they are weaned before shearing and put onto a sown pasture.

The aim is to sell crossbreed lambs to market between the end of August and the end of September at 20-22kg carcass weight (approximately five months). The Merino lambs are sold at the end of September on hook at 18-22kg carcass weight. Ideally their weight would be higher but even with another month of feed the lambs rarely exceed 22kg carcass weight.

Trading of sheep has been performed opportunistically in the past but is not a consideration this year due to the poor finishing springs of late.

**Grazing**

The Morrells have about 600ha of stony land that is left for volunteer, regenerating pastures. This is mainly a mix of barley grass and burr medic. Sown cereal pastures have become a more recent addition to their practices due to the low seed set that has been observed in the regenerating paddocks. Sown pastures are normally a mix of barley, triticale and oats, sown at a higher than normal rate to increase dry matter for grazing. Sown pastures are sown with a fertilizer rate of around 40kg DAP at seeding.

Winter cleaning, spray-grazing and spray-topping are not practices that are regularly implemented on the farm. This
Implementing Sustainable and Productive Forage System in the Mallee

By Linden Masters - Sustainable Farming Systems Consultant
Rural Solutions SA

What are the strengths of the system?
Adoption of new farming practices have allowed the Morrells to keep moving forward. Trying new ideas on their own property before large-scale implementation is a sound management procedure.

A 4,000ha unit is an ideal size for farming in the Mallee, allowing machinery capitalisation to effectively pay its way.

The use of sheep in the system allows flexibility to maintain a high continuous cropping scenario and utilise different land classes.

A self replacing Merino flock allows the Morrells to keep a good breeding line without having to buy in from varied sources.

Using the more frost prone areas for hay or feed is an excellent strategy.

What are the possible challenges within this system?
Cropping is often compromised when running livestock. The 80%-20% certainly allows more flexible options than a 50:50 operation. Weed control, retention of organic matter, compaction and ground cover in poor seasons are known problems. The use of the drought feedlot certainly help the latter as well as providing flexibility needed with stock feed requirements and different seasons.

A suitable break crop for low rainfall farming system is much needed. Canola has shown promise as an alternative crop at the Waikerie MSFP trial site where the crop has responded positively to the cereal rotations, but as mentioned returns may be slim.

What can be implemented in the future?
Current indications are that ewe hoggets are culled at 1.5 years. Earlier culling will allow lambs not required, to be sold at a higher price per kg than if they were sold as hoggets. This extra feeding could also be better distributed into ewes that produce lambs.

Selecting breeders using micron testing is an effective way of obtaining an even wool clip. This can be done early without having to wait until sheep reach 1.5 years.

Separation of ewes and lambs in the feedlot allows different rations to suit the requirements. The extra effort of weighing lambs going into the feedlot allows the tail of shy feeders to be removed maximising production and the health of these animals.

The main weed problem is skeleton weed, which has increased its population slowly over the years. Its removal is now a long-term process that includes one hit prior to sowing and another more selective spray of patches on the stubbles after harvest.

The Merino and cross bred flocks are normally both run in mobs of 400-500. Sheep are used in summer on stubbles to eat remaining grains to prevent volunteer cereals in the crop next year.

Grazing is monitored to ensure that there is still adequate ground cover to prevent erosion.

One sown pasture paddock, used for fattening crossbreed lambs, was cleaned due to the large amount of barley grass in the paddock.
Challenges of Moving to No-Till

**Case Study Seventeen** - Ian Symonds
Interviewed by: Mehdi Zaboli

**Background**

Ian Symond runs a one man mixed farming enterprise at Copeville. The business is 50% cropping and 50% sheep. A large portion of the farm is scrub and non-arable (1300 ha) and only 20% of this area can be utilised for grazing. Soil drift and erosion are the biggest issues, therefore understocking paddocks is necessary to minimise soil erosion.

No-till was introduced three years ago. Even though Ian has found disadvantages with no-till, he believes they are outweighed by the advantages of the system. Currently crops are sown 50% no-till and 50% conventional sowing; however Ian hopes to be 100% no-till farming in a few years time.

**Cropping**

Ian has no fixed rotation for his cropping paddocks. Some paddocks are continuously cropped, whilst others may be cropped every two, or up to six years.

Summer weeds are controlled in paddocks that will be prepared for cropping with one or two herbicide applications. Sulfonyl Urea (SU) herbicides are also used most years for weed control in cropped paddocks.

Ian aims to sow as early as possible. In seasons with good spring rainfall there is little difference between early or late sown crops, however spring conditions tend to be dry more often than not, so it’s better to sow early.

Paddocks are prepared differently depending on soil type and weed burden. Ian's no-till machine is a Morris air seeder with narrow points, and press wheels on 30 cm row-spacing.

In no-till paddocks, root disease is visibly worse than in conventional paddocks that have been worked once prior to sowing. The trade off is that wind erosion is not a problem.

Cereals are sown for feed in March/April if paddocks are clean enough but if weeds are a problem, Ian will wait for opening rainfall to spray weeds and sow crops by mid-May. Feed needs to go in early so that the grain can be harvested if there is the opportunity.

In the case of a late break, cereal feed is not sown as there is no opportunity for grain harvest and supplementary feeding is an option in pasture paddocks.

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**At a Glance**

**Location:** Copeville  
**Total Area:** 3000 ha  
**Annual Rainfall:** 275 mm  
**April-Oct Rainfall:** 180 mm  
**Main focus of enterprise:** Cropping 50%  
Livestock 50%
In preparation for cropping, pasture paddocks are sprayed to remove saffron thistle, barley grass, and brome grass. A grass selective is used mid-July, or spray-topping takes place with Gramoxone® (paraquat) or glyphosate in September/October.

Costs of fertiliser and fuel are the most challenging cropping issues.

### Livestock

Ian runs around 870 Merinos on his property, consisting of 570 breeding Merinos, 280 hoggets, and 20 rams. Lambing takes place in April/May with an average drop of 600 lambs. Wether lambs are sold mid September, and ewe lambs are kept until hoggets when 100 are sold with older ewes (over 4.5 years) in October. The rest stay in the mob for breeding and replacement.

Ian does not target any weight for sale, although has considered setting up a feedlot for this purpose in the near future.

### Grazing

The sheep are run in four mobs - three mobs of ewes (200 average), and one mob of hoggets.

Stock are grazed on stubbles, regenerating weedy pasture, sown triticale, 70 tonnes of hay and up to 40 tonnes of grain depending on grain price at the time.

Depending on feed availability, some pastures may be winter cleaned each year in mid July.

During summer, sheep run on stubble paddocks. Once they start losing weight they are supplemented with hay and grain (mainly oats and barley). Ian is happy to have no summer rain, as dry stubble is better for the sheep. In the event of summer rain summer weeds will be left for grazing in paddocks going into a pasture phase.

Water troughs are located on the stonier areas, in the middle and/or corners of the paddocks to lessen erosion risk. Water is supplied to troughs from an on-farm bore at reasonable pressure, by 25-32mm piping.

Maintaining reasonable ground cover is an ongoing challenge. The average paddock size is 120-150ha which makes it difficult to graze evenly. To minimise soil erosion, paddocks are understocked to reduce the grazing pressure.

In autumn, sheep feed on what is available in the paddocks plus hay. Lambs may be fed supplementary grain when they are one month old. In a late break season hay and grain is fed until it runs out, in which case more hay may be purchased.

In winter Ian relies on paddock feed with some grain fed to weaner lambs.

If feed availability is low in spring, older ewes (up to 200) may be sold. Sheep may also be turned on to drought affected cereal crops. If good spring conditions provide lots of feed, older ewes may be kept for breeding and sold in the following year. Certain paddocks may also be chemically fallowed in preparation for cropping.

Shearing takes place mid-August every year and finding shearers is an ongoing livestock issue. Trying to manage the erosion caused by sheep is another difficulty, as once paddocks are eroded they become too rough for no-till.
What are the strengths of this system?
Care is taken to reduce the impact cropping and grazing have on exposing the soil to wind erosion. This is done by conservative stocking pressures; supplying supplementary feed; and making decisions in regards to the pros and cons of sowing feed dry and disturbing the soil profile.

Ian understands his farm and has instigated practices he is comfortable with and that are suitable from his experience to return a profit.

What are the challenges within this system?
It may be that selling breeding stock to maintain ground cover and then needing to buy them back, probably at a high price is a significant opportunity cost. Losses from forgone income from wool, sale of surplus animals and reducing the rate of build up in a recovery phase may be experienced.

Agisting out may be worth assessing.

There are weed introduction risks associated with bringing in hay that need to be managed.

What could be implemented in the future?
Establishing and gaining experience with confinement feeding of sheep would be advantageous and has been identified as a future development. These feedlots do not need to be elaborate. Many are now set up and operational and could be visited in the Mallee to gain ideas and discuss positives and negatives. There is much written information also available. Labour might be an issue being a one-man operation but is probably not much different to feeding in the paddock. Some infrastructure may need purchasing.

This could also add further flexibility with lambing time if able to lamb later which could help take the pressure off at the break of the season. A change in lambing time might also necessitate a change in shearing time, but as with setting up a feedlot, help in evaluating a change in lambing time is available from local farmers and written information.

Specific crops like triticale (if the yields are good enough) may better suit grain feeding of stock as a supplement. Lambs require a supplement that is high in energy and protein, and lupins alone, or in a mix are ideal but may not be suitable to be grown on farm. If conserving grain for livestock feeding, identify and keep high protein and energy grain if possible.

The summer erosion risk could be more easily managed by combining mobs (from 4 mobs into 2 mobs). This would increase the rate at which they would need to be rotated but also increase the rest of each paddock.
Making the most of Stony Soils

Case Study Eighteen - Craig & Nicole and Robert & Margaret Duffield

Interviewed by: Mehdi Zaboli

Background

Craig Duffield is a third generation farmer. His farming business is located on the Stockyard Plains, west of Waikerie. He runs a mixed farming enterprise comprising 70% cropping and 30% sheep, with his father Robert and family.

Of 4000 ha, Craig can only crop 1860 ha which is mainly sandy or stony. 1200 ha is un-arable pastoral soil that can only be grazed, and the rest is scrub without any grazing potential.

Craig has been no-till farming since 1995 and he believes that the implementation of no-till before the recent dry period has been a critical success factor in coping with drought. He is a current SANTFA member.

Craig also works off farm in a number of different roles; as a hail damage assessor, a contract hay baler, and a truck driver when farm work load allows.

The mixed farming enterprise runs with 1.5 labour units which includes Craig, his father and wife Nicole. Shearers and farm hands are employed at shearing and seeding. Craig & Nicole have just recently taken over the business. Craig hopes to investigate change from a tyned seeder to a disc machine to get crops germinated earlier in dry years, increase the speed of seeding, and simplify operations.

Cropping

Paddocks are continuously cropped with wheat, wheat, barley or wheat, wheat, triticale, barley rotations. A Simplicity air seeder is used with narrow points on 12” (30 cm) row spacing and press wheels. The average paddock size is around 160 ha.

At a Glance

Location: Waikerie
Total Area: 4000 ha
Annual Rainfall: 250 mm
April-Oct Rainfall: 180 mm
Main focus of enterprise: Cropping 70%
Livestock 30%

Summer spraying takes place with a mix of glyphosate and Garlon® (triclopyr) in preparation for cropping. Target weeds are innocent weed and melons, which are sprayed from early December to mid January. Other summer weeds can be a problem which may require the addition of Surpass® (2, 4-D amine) or an application of Gramaxone® (paraquat).

In addition to summer weed control and grazing, Craig may use Logran® (triasulfuron) every three years after a barley crop to remove volunteers before seeding the wheat crop.
The main issues with cropping include rising fertiliser and herbicide inputs costs and deregulation of grain markets, meaning farmers have to spend more time in the office. The latter is made worse by poor mobile phone coverage in rural areas.

**Livestock**

Each year 500 Merino ewes are mated to produce 500 cross bred lambs. Lambing takes place in April. Ewes are shorn in July and lambs in September-October.

Lambs are sold within 12 months and usually sold off stubbles because it’s cheaper, but if their condition is average or prices are poor, lambs are lot-fed until they can reach 18-24 kg on hooks at the Dublin abattoir.

20% of the old ewes are culled and sold with the lambs and 100 head are purchased for replacement.

**Grazing**

Sheep are normally kept in three mobs and grazed on 1215 ha station pastoral and weedy pasture land. 1800 ha of stubble is available after harvest plus 6 ha salt bush. Around 20-30 tonnes lucerne hay, and 30 tonnes grain (70% barley, 10% wheat, 10% lupins, 10% Laucke supplement) is kept on hand for feeding.

Craig produces his own lucerne hay under irrigation.

Sheep go on to stubble paddocks right after harvest until the break of season. To prevent soil erosion, paddocks are closely monitored. If it looks as though hill tops may become too bare, sheep are removed from the paddock.

In an early opening season, sheep will be confined to two or three paddocks so the rest can be sprayed. Those two or three paddocks will then be sown last.

In a late break, supplementary feeding continues and sheep will go on grazing in non-arable stony paddocks. The confinement lot also comes in handy and Craig generally operates two pens of 250 sheep. Each mob is rotated through a feeding pen, so all sheep are fed every second day (maintenance ration only).

Feed shortages can occur during winter due to continuous cropping and the limited number of pasture paddocks. In this situation they may graze a cereal paddock (such as triticale) and continue hand feeding in a confinement area.

The main livestock issues include the high costs of hand feeding and supplements, the lack of good autumn rainfall to get the feed going, and the high volatility of the prime lamb market that can result in $1-2/kg price fluctuations.

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**Key Messages**

- Flexibility needs to be maintained to cope with dry seasons.
- No-till has helped increase productivity and water use efficiency.
- Diesel Mechanic skills are used to maintain older machinery which can defer purchase of new machinery.
- Off-farm income through hay contracting and truck driving, adds diversity to the business.
Implementing Sustainable and Productive Forage System in the Mallee

By Tim Prance - Senior Consultant, Pastures and Grazing Systems
Rural Solutions SA

What are the strengths of this system?
Duffield’s farming system is flexible, and makes best use of different land classes, as the best arable land is continuously cropped, and the non-arable land is used for grazing. They also have a lamb feedlot to finish lambs if they run out of feed.

What are the possible challenges within this system?
The issue of lack of autumn rainfall for pasture growth can be resolved by later lambing.
Winter stocking rate is 500 ewes and lambs, which is approximately 1700 DSE on 1200 non-arable ha = 1.4 DSE/ha. One DSE eats 1 kg green dry matter/day, so total pasture consumption during the growing season totals about 200 kg/ha/year. I would expect even a poor pasture, to produce 1200 kg/ha green dry matter during the growing season in a poor year. So, an investment of time and capital in using grazing management to improve pasture use will produce dividends.
The high cost of hand feeding and supplements can also be resolved by focussing on grazing management to improve pasture utilization.
It is difficult for one person to optimally manage both cropping and stock as there will always be conflicts. Cropping will normally take precedence given the higher input costs and greater risk, compared to livestock. Therefore the sheep system has to be simple and flexible, which it is on this farm.

What could be implemented in the future?
Even in a dry area, with 180 mm growing season rainfall, there are opportunities to increase livestock numbers. This could be done with dry sown cereals and temporary electric fencing on non-arable stony country to get a feed wedge in front of livestock during early winter.
Confinement feeding will do a similar job, but costs money for supplementary feeding, and is not so suitable for lambing ewes. Should lucerne hay be sold off-farm at $400/t and a cheaper source of grain be bought in for livestock?

There is a trade off! On one hand, there is great potential to improve sheep carrying capacity in the drier areas, but this will require greater management inputs with either grazing management or confinement feeding. I maintain that improving grazing management is a cheap, low risk option.

In this case, Craig also has a choice as to whether he uses his skills off-farm for truck driving or hay making, or uses them on farm to manage sheep. Investment in good sheep handling facilities will make looking after sheep more attractive. Also, moving out of sheep on this property will mean no income from the non-arable country.
Successful enterprise without livestock

Case Study Nineteen - Wade & Danielle and Chad & Kate Nickolls

Interviewed by: Tim Prance

Background

Wade, Danielle, Chad and Kate are young farmers running a fourth generation farming business 15km south of Pinnaroo. The farming business is 100% cropping – for grain and hay. The farm’s soils are mostly loams, with 15% sand over clay, and 15% sands.

There is no livestock component to the Nickolls’ system and the farm employs 3 labour units.

Cropping

There is no fixed rotation. A typical rotation will include wheat, barley, canola, peas, lupins, triticale, oats and vetch.

The property is 100% no-till, one pass seeding using knife points and press wheels. The seeder is a Horwood Bagshaw PSS bar (precision seeder with parallelogram tine and depth control system). Seeding is on 12 inch (30 cm) row spacing, with 5 cm press wheels. Seed and fertiliser are sown through the same tube. The seeder has double shoots for seed and fertiliser, but the double shooting mechanism is not being used for now, as fertiliser rates at seeding are not high enough.

For cropping preparation, paddocks are sprayed with a knockdown herbicide before sowing, as soon as any green material appears.

Sulfonyl urea (SU) herbicides are hardly ever used, and if used, will be Ally® (metsulfuron methyl) for summer weed control. Summer weeds are knocked out, as soon as they appear.

The main problem weed is annual ryegrass. The aim is to obtain two consecutive ryegrass controls during each rotation, using a range of different chemical options. For example, canola or lupins/peas followed by a cereal cut for hay. The cereal can be crop topped before hay cutting, to prevent grassy weeds setting seed.

No-till farming has enabled all parts of the farm to be cropped, including sand hills previously considered non-arable. This has subsequently enabled animals to be removed from the farm.

Variable Rate Technology is being utilized. Yield monitors are fitted to the harvester, and fertiliser is applied to subsequent crops according to yield zones. EM38 mapping has also been used to produce soil maps of each paddock, showing the different soil characteristics.

Fertiliser is applied according to crop/hay removal in the previous year. Currently, between 20 and 60 kg/ha DAP is applied at seeding, with an average 35 kg/ha DAP.

Control strips (nil and high fertiliser rates) are left in most paddocks each year to assess economic benefits of yield mapping and fertiliser rates. If no economic benefit is obtained,
Implementing Sustainable and Productive Forage System in the Mallee

The keys to the success of their farming business are not to overcapitalise on machinery and utilise machinery fully. Maintenance is critical to get the most use out of expensive machinery and as capital costs increase, it may be worthwhile to investigate leasing more land rather than buying.

**Why are livestock not in the system?**

Livestock are not as profitable as cropping. This is exacerbated because the grain break even yield of only 0.8 t/ha grain, and this is achievable even in a dry year with efficient cropping practices.

Livestock impact on weed seed placement, soil compaction and ground cover, especially the varying ground cover within a paddock due to the way animals graze.

Before livestock were removed from the system, the Nickolls found that too much time was spent with livestock at critical cropping or hay making times. Time spent with livestock would be easier to justify if their returns were similar to cropping.

**By Linden Masters - Sustainable Farming Systems Consultant**

**Rural Solutions SA**

**What are the strengths of this system?**

A well thought out farming program allows flexibility of rotations and excellent utilisation of their natural and human resources. The advantage of being a fourth generation farming business is not to be underestimated. It shows what co-operation, vision and succession planning can achieve.

Understanding and using new technologies such as yield monitoring, EM38 mapping, and variable rate technology will continue to give the Nickolls the edge into the future. The excellent knowledge of their soils and cropping systems also allows them to take advantage of this technology.

The practice of cutting a cereal for hay using a crop top before slashing allows an additional rye grass control of any escapees helping to keep herbicide resistant problem weeds out of the system longer. This also gives the option to sell the hay or use it in a feed lot.

**What are the possible challenges in this system?**

The policy of not overcapitalising on machinery, and having a good maintenance and replacement program is critical. Looking for new opportunities for use of this machinery may allow expansion of the business if needed.

**What could be implemented in the future?**

This family business has now moved to a 100% cropping focus. Hay is obviously available for feeding stock. While traditional experience in Mallee farming is to have livestock in the system to assist in managing risks; if a cropping business is bringing in good returns and carefully managing this risk then there is really no reason why it cannot be a successful and viable business. It has also recognised that stock in the system can compromises the cropping program as well as needing additional infra structure and labour.

Each farmer needs to “do their sums” and make realistic comparisons between enterprises. The efficiencies and gross margins will often reflect the individual operator’s skills and/or passions. The Nickolls are noted for their cropping operation and have proved that investing time to follow the strengths of the operators is paying great dividends.
Cattle and Cropping - Neck and Neck for Profit

Case Study Twenty - Jeff, Adam & Giles Oster
Interviewed by: Tim Prance

Background

Jeff, Adam and Giles Oster run an intensive cropping farm with an important cattle component, about 6 km north of Pinnaroo. Property size is 1400 ha; all arable and all soils are sand over clay. The livestock component consists of cattle, with no sheep in the system.

The farm has 3 family labour units. Adam manages the cattle trading and the confinement area, Giles looks after the cropping, whilst Jeff coordinates the whole operation. All family members are involved in planning the years farming operations where they pay close attention to detail. The livestock are managed so they do not compete with cropping for labour, and are expected to pull their weight in terms of production and profitability.

The Oster’s keep up to date with new ideas and thoroughly investigate before changing. They see their farm continually evolving in the future and are not afraid to make changes once a plan is costed and confirmed. Soils are improving, and becoming softer and more friable with their current system.

They are conservative with regards to machinery purchases and replacement. The aim is to try and fully utilise equipment, for example using their own truck to cart livestock as well as grain as much as possible.

Cropping

A typical rotation will start with peas, then wheat, barley, wheat or barley, canola and vetch for grazing, wheat, barley, peas. Rotations do remain flexible to address paddock and grazing issues as well as maximising profit.

The property is 100% no-till using narrow points with an inverted T. Seeding is on 9.5 inch (24cm) row spacing, with 8cm press wheels. Seed and fertiliser are sown through the same tube. For cropping preparation, paddocks are
sprayed with a knockdown herbicide before sowing, as soon as any green material appears.

Sulfonyl urea (SU) herbicides are hardly ever used. Occasionally Ally® (metsulfuron methyl) may be used for summer weed control. Summer weeds are sprayed as required as soon as they appear. The cropping issue of most concern is annual ryegrass.

Generally, stubbles are not grazed over summer, as the farm livestock operation is a completely flexible trading system incorporating an on-farm cattle confinement area.

**Livestock**

The Oster’s run a mob of up to 200 mixed sex calves, purchased in early July at around 200 kg live weight.

Calves are grazed on 200 ha canola and vetch sown specifically for this purpose. There are no other pastures. The area of canola and vetch can vary considerably from year to year, and the aim is to purchase one calf for each ha of canola and vetch sown.

Target weight for calves is 300 – 350 kg by November, when the heifers and some steers can be sold. The remaining calves go into their own feed lot over summer. These are then sold the following autumn/early winter as 450 – 500 kg bullocks. The confinement area target is 150 kg live weight in 90 days.

The canola and vetch is treated as a proper break crop (along with peas), and is placed mid way in their rotation. These paddocks are sprayed with Select® (clethodim) to remove grasses and volunteer cereals in early winter, and are then spray-topped with glyphosate at the first sign of annual ryegrass starting to flower (mid September). The vetch provides valuable nitrogen for subsequent cereal crops. No fertiliser is applied to the canola and vetch grazing paddocks.

This system is very flexible. Because canola can’t be sown dry, more vetch is added to dry sowings in years with a late break. There are no problems with livestock grazing pressure in late breaking seasons, as any animals still on the farm, are in the confinement area, whilst the purchase of replacement animals can be delayed.

There is also an option (not yet explored) of grazing newly sown cereal crops with young 200 kg weaners.

**Grazing**

During winter, young calves are rotated through up to three or four paddocks sown to canola and vetch. Once this feed is eaten out in late spring, animals not sold are moved to the feedlot.

The Osters can see potential in controlled (strip) grazing in winter through the use of electric fencing, and feed budgeting to allocate a three day pasture ration to cattle. Improved pasture utilisation could increase cattle numbers by 25%, and make them more profitable than some crops. There are electric hot wires around most paddocks, with well located troughs, so setting up a strip grazing system will be relatively simple.

Hay is made from cereal crops, and surplus cattle feed, for use in the confinement area and when cattle are introduced to canola and vetch for grazing.

Livestock gross margins are carefully monitored relative to cropping, and currently they are considered similar. However, there is potential to further improve cattle
profits through more intensive grazing management in winter.

Livestock issues of most concern are the maintenance of fencing and water points and the sourcing of suitable store livestock in early winter. This process takes time and commitment, but is helped by valuable contacts that are built up over time.

By Bruce Hancock - Senior Livestock Consultant
Rural Solutions SA

What are the strengths of this system?
Long term benchmarking services indicate that cattle livestock trading is the most profitable livestock enterprise, but least practiced. Along with good profit, it is flexible in scale, duration and demand and supply.

The sown feed cost per head and per kg of feed produced of this operation could be far less than many sheep operations in this district as 200 ha of sown feed at $75/ha = $15,000 ÷ 200 head = $75 per head, and at an average 10 DSE per yearling = $7.50 / DSE. It can cost up to $35 /ewe in sown feed and at 3.0 DSE/ewe during winter = $12/DSE

Cattle are softer on sandy soils as they are non-selective grazers and don’t tend to camp on rises. The rotation is very strong on the most reliable and profitable crops with 5 years of wheat and barley, and 2 years of break crops in seven years, and it would appear the canola or vetch for grazing give good options in annual ryegrass control.

What are the possible challenges within this system?
Growth rate is the key driver of livestock trading and the lack of control in genetic selection may have room for improvement by buying progeny from bulls with known and good Estimated Breeding Values (EBV’s).

There is a risk of health problems – bloat, pulpy kidney, red gut, grass tetany when grazing pasture monocultures and stock will require regular monitoring, and some preventative health treatments.

What could be implemented in the future?
In terms of genetics, there is mention that “valuable contacts are built up over time” which are often originally only supply based, but over time and with two way communication and objective feedback on how the yearlings perform, some breeders will make change to quantify the genetics they are supplying.

Putting the light and unfinished stock through the expensive feedlot at the end of the fodder growing season can sometimes result in lower total margins as they are the slower growing, poorer feed converters and may take twice as long to finish. Given yearlings are currently bought when they are in least supply, could they be bought in autumn when cheaper and held on a maintenance ration in the feedlot or out on agistment, which understandably may create labour competition with cropping? Alternatively, livestock transport is now truly national and cattle can be sourced from afar.

Maintenance of water points is often reduced by ensuring the trough is on a firm and large gravel base and is flat bottomed and has good water flow, possibly requiring a tank to ensure there is a good water head.
The MLA Feed Demand calculator enables you to determine the total feed demand of all the livestock on your property, for each month of the year. You can then compare monthly livestock demand to the likely supply of pasture/stubble.

Using this tool will show you:
- How much of your pasture your livestock are consuming.
- The size of your pasture shortage, or surplus, at various times of the year.
- How many kilograms of live-weight you produce per hectare.

The MLA Feed Demand calculator is based on CSIRO decision support tools GrazFeed and GrassGro. It is available free of charge from the MLA web site at www.mla.com.au, then navigate to the Feed Demand calculator on the right hand side of the screen.

### Livestock
- 200 mixed sex weaner cattle introduced July 1st
- Average live weight at purchase of 200 kg
- Moved off the canola and vetch mid November as “fats” or to the on farm confinement area
- Average weight at this time is assumed to be 350 kg for the steers and 300 kg for the heifers

### Area of Feed Available for livestock
- 200 ha canola and vetch available for grazing

### Dry matter available for livestock
Canola and vetch = 3600 kg/ha DM (June-October)

### Feed Demand Vs Supply

<table>
<thead>
<tr>
<th>Key Performance Indicators</th>
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<tbody>
<tr>
<td>Pasture deficit, using freshly grown supply</td>
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<tr>
<td>Pasture deficit, using supply with carryover</td>
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<tr>
<td>Liveweight produced, cattle</td>
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<tr>
<td>Liveweight produced per ha allocated to cattle</td>
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<tr>
<td>Liveweight produced, sheep</td>
</tr>
<tr>
<td>Liveweight produced per ha allocated to sheep</td>
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<tr>
<td>Pasture demand as a % of pasture grown</td>
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</tbody>
</table>
There are two pasture curves in the Feed Demand Graph.
The light green line shows the potential monthly supply of pasture and stubble (total tonnage of dry matter).
The dark green line shows the monthly tonnage of pasture and stubbles, following grazing; assuming that only 2/3 of surplus feed is carried forward from the previous month (i.e. monthly supply less livestock demand with carryover).
The columns at the bottom show the total livestock demand for pasture in each month (i.e. what livestock are eating)

Livestock demand takes into account pasture/stubble quality i.e. the metabolisable energy levels.

Where the shaded bars exceed monthly pasture/stubble supply, additional livestock feed will be required. This may come from
- Supplementary feed
- Increasing pasture growth (e.g. applying nitrogen fertiliser in winter)
- A forage crop.

Pasture demand % (in the key performance indicators) is the ratio of total annual demand of the livestock to the total annual supply of pasture.

**Summary**

The Feed Demand calculator will show where potential feed shortages occur if weaner cattle numbers are increased, along with indicating how many tonnes of pasture feed will be required each month. The calculator can also show the target daily live weight gains required to meet the meat production per hectare target.

The Feed Demand calculator can also be used to evaluate different scenarios, such as time of buying and selling, along with evaluating the best way of filling the feed gaps.

**Interpretation**

On the Oster’s farm, there is no overall feed deficit, as freshly grown canola and vetch is carried over into November.

The Oster’s meat production system is highly productive, producing 250 kg/ha live weight per year from pasture. There is still potential to further improve this considerably, as only 28% of the grown feed is used.

As identified already by the Osters, controlled grazing using electric fencing in winter is the key. This will enable more cattle to be carried in winter, plus enable more high quality feed to be carried into late spring. Grazing control will keep feed shorter, and stop it running to head too early.

If pasture demand could be increased to 50% of production, then meat live weight for the period from July to November could be increased to 450 kg/ha. This is an extra $200/ha for an investment in time to shift fences!
Cell Grazing

When grazing pressure is increased to a high level such as 50 DSE/ha plus, for short periods such as between 3 and 14 days to improve pasture/stubble/dry feed utilisation and reduce animals camping on areas prone to erosion. This can be done by using portable electric fences, or by erecting permanent fences, or by combining livestock mobs.

Confinement Feeding

Confinement feeding (sometimes known as lot feeding or feed lotting) is an intensive feeding system for maintaining breeding animals in a confined area where all, or the majority of feed and water are supplied.

Dry Sheep Equivalent

DSE: A measure based on the feed requirement of a 50 kg dry sheep, used as a measure of stocking intensity.

Dry matter

Measured in kg/ha dry matter (dried weight of plant matter).

Feed Budgeting

A method for closely matching pasture feed supply and grazing animal demands.

Grain and Graze

G&G: Sowing and treating cereals as a source of feed for stock, then leaving it for a grain harvest, if the opportunity exists.

Hay Freezing

A spray-topping technique where annual grass seed production is prevented using a chemical herbicide in early spring, preventing the loss of energy and protein which normally occurs as grasses mature and removing grass seeds. Chemical application rates are higher than those used for pasture topping.

Hogget

A young sheep of either sex which has two permanent cut teeth and before it has four cut teeth (1-2 years old).

No-Till

When the crop is planted (drilled) into undisturbed soil using equipment with narrow seeding points, designed as to be able to handle previous crop or pasture residues. Chemicals are generally used to kill weeds or other plants prior to planting.

Pasture Topping

A method of reducing grass set in a pasture in years before cropping. Initially pasture is grazed heavily in winter and left free in spring to enable all grasses come to head at the same time. A low rate of knockdown herbicide is then applied to prevent seed set.
<table>
<thead>
<tr>
<th><strong>Seed Bank</strong></th>
<th>A reserve of seed in the soil that will germinate in coming seasons.</th>
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</thead>
<tbody>
<tr>
<td><strong>Spray Grazing</strong></td>
<td>The use of low rates of phenoxy acid “hormone-type” herbicides to increase plant sugars, and make broadleaved weeds such as capeweed, salvation jane and brassicas more upright, increasing palatability to livestock. If heavy grazing is implemented a few days later, the stock will eat the weeds, leaving annual legumes to grow with less weed competition.</td>
</tr>
<tr>
<td><strong>Stocking Rate</strong></td>
<td>The number of animals grazing/utilising a set unit of land, for a specified period of time.</td>
</tr>
<tr>
<td><strong>Stubble Retention</strong></td>
<td>Plant residues from a previous crop that are retained and either incorporated or left as mulch on the surface.</td>
</tr>
<tr>
<td><strong>SU Herbicides</strong></td>
<td>Herbicides such as Logran® and Ally® which are Sulfonyl urea active and belong to the Group B Herbicide family. SU herbicides are often used to control broad leaved weeds.</td>
</tr>
<tr>
<td><strong>Succession Planning</strong></td>
<td>The intentional planning by the current business operator, and the next generation business operator, to ensure the continual success of the business as it passes through the generations.</td>
</tr>
<tr>
<td><strong>Volunteer Pastures</strong></td>
<td>Pastures that have not been sown, but instead consist of plants that are naturally present.</td>
</tr>
<tr>
<td><strong>Winter Cleaning</strong></td>
<td>Winter use of selective herbicides, to remove undesirable weeds. The main benefit of this process is that by removing the undesirables from your pasture you can increase the number and density of desirable species.</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>ASBV</td>
<td>Australian Sheep Breeding Values</td>
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<tr>
<td>CFA</td>
<td>Cast For Age</td>
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<tr>
<td>CoP</td>
<td>Cost of Production</td>
</tr>
<tr>
<td>DAP</td>
<td>Di-Ammonium Phosphate Fertiliser (18% Nitrogen + 20% Phosphorus)</td>
</tr>
<tr>
<td>DM</td>
<td>Dry Matter</td>
</tr>
<tr>
<td>DSE</td>
<td>Dry Sheep Equivalent</td>
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<tr>
<td>DW</td>
<td>Dressed Weight</td>
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<tr>
<td>EBV</td>
<td>Estimated Breeding Values</td>
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<tr>
<td>FOO</td>
<td>Feed On Offer</td>
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<tr>
<td>G&amp;G</td>
<td>Grain and Graze</td>
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<tr>
<td>LVE</td>
<td>Low Volatile Ester Herbicide</td>
</tr>
<tr>
<td>LW</td>
<td>Live Weight</td>
</tr>
<tr>
<td>MAP</td>
<td>Mono-ammonium Phosphate Fertiliser (12% Nitrogen + 22% Phosphorus + 2% Sulphur)</td>
</tr>
<tr>
<td>MSF</td>
<td>Mallee Sustainable Farming</td>
</tr>
<tr>
<td>SANTFA</td>
<td>South Australian No-Till Farmers Association</td>
</tr>
<tr>
<td>UAN</td>
<td>Urea and Ammonium Nitrate fertiliser</td>
</tr>
</tbody>
</table>
Grain & Graze www.grainandgraze.com.au
The Grain & Graze Program commissions research to help mixed farmers improve the profitability and sustainability of their farms.
The website features information on grazing winter cereals including a Feed Budget Calculator to assist farmers to develop a grazing plan for winter.

Meat & Livestock Australia (MLA) www.mla.com.au
MLA is a producer-owned company, working in partnership with industry and government to achieve a profitable and sustainable red meat and livestock industry.
The website features a range of resources and calculators that are available to help manage your business
- BeefSpecs calculator
- MLA feed demand calculator
- Stocking rate calculator (beef and sheep)
- MLA cost of production calculator (lamb)
- MLA cost of production calculator (beef)
- Health cost benefit calculator
- Calving histogram calculator

Sheep CRC www.sheepcrc.org.au
The aim of the CRC Program is to turn Australia’s innovations into successful new products, services and technologies and make the Australian sheep industry more efficient, productive and competitive.
The Sheep CRC website has an ‘Industry Tools and Information’ directory that can be utilised so source a wide range of information in regards to breeding sheep. Their ‘merino versus terminal sire flock model’ was one of the programs highlighted in this publication.

Australian Wool Innovation www.wool.com.au
The mission of Australian Wool Innovation Limited (AWI) is to drive research, development, innovation and marketing that will increase the long-term profitability of Australian woolgrowers.
The Australian Wool Innovation website features information on animal health, monitoring, cost of production etc.

Mallee Sustainable Farming Inc www.msfp.org.au
Mallee Sustainable Farming (MSF) Inc is a farmer driven project servicing the < 350-mm rainfall Mallee cropping regions of New South Wales, Victoria and South Australia.

Primary Industries and Resources SA (PIRSA)
The link above will direct you to help with some basic information on livestock management during a drought including guidelines for the establishment and operation of cattle feedlots in South Australia.