final report

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Blinman and Hawker
Bestprac - Fencing

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Management Systems for Hardy Sheep Breeds in Pastoral Conditions

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2007/S03 - Blinman and Hawker Bestprac - Fencing
Management Systems for Hardy Sheep Breeds in Pastoral Conditions
Bill McIntosh
Gum Creek Station
via BLINMAN 5730 SA

MUTTON & LAMB

BUDGET 15000

Aim:
Develop a management plan and protocols to successfully run hardy meat breed sheep under South Australian pastoral conditions.

Objectives:
Develop sound management plans for running hardy sheep breeds in pastoral conditions to:
►Increase gross margin returns by from $15/Dry Sheep Equivalent (DSE) to $20/DSE.
Achieve a return on capital invested (new fencing, new yards etc) of at least 8% per annum.
Ensure that rangeland health is maintained or improved by the different grazing of South African breeds (ie greater level of browsing).

Co-ordinator's Comments

26/01/2010	Received revised FR still has not put MLA logo prominently on front cover! Better conclusions but still misses original targets. Chasing a WORD version of FR.
27/11/2009	Received the FR which is pretty comprehensive, but poor data on actual escapes. Dry conditions took away management options. Requested revision of some aspects of FR with more reporting on original Objectives.
15/07/2009	Report 3 shows very interesting observations about Dorper sheep behaviour but slow electric fencing program and 2 very poor years have reduced trial option. Group considering extension.
22/09/2008	Project has been a little delayed due to very dry conditions but group is committed to project and well lead by John Squires of Rural Directions. I attended and spoke on behalf of MLA at their well run Field Day on 5th August with 20 attendees. Tom Mugford, Gallagher SA & NT Manager also attended with a very valuable contribution. New electric wires had been run about 5 klms out to trial paddock.

15/05/2008	Received copy of their first project newsletter - very good. Requested full explanation of their other funding support and their first report.
11/02/2008	No contract developed yet despite being sent to MLA in November 2007. Anna chasing up. Group keen and getting organized well.
9/12/2007	Group waiting on Enviro funding for capital. Will look to start now in October, 4 months late. Still to answer first letter queries.
19/10/2007	Now have Enviro Grant working with group. Sequence of Activities being revised a little.

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Management Systems for Hardy Sheep Breeds in Pastoral Conditions

FINAL REPORT APRIL 2010

Contents

Management Systems for Hardy Sheep Breeds in Pastoral Conditions

Objective

There is a common trend in South Australian pastoral enterprises to change from a wool based enterprise to a meat based enterprise through the use of South African breed sheep, commonly Dorpers and Damaras. The main reason behind this shift is the envisaged increase in profitability through:

- Reduced labour requirements
- Reduced production costs (shearing, crutching etc)
- Increased returns from meat as opposed to wool
- Increased lambing percentages

Gross Margins were calculated by various Bestprac Groups in South Australia, comparing the financial results of a Merino based enterprise to a Dorper enterprise (see Appendix Two). As a result, there was interest generated by group members in the potential of Dorpers in the South Australian rangelands. A concern of the group members was the ability to successfully contain Dorpers to eliminate contamination of a Merino flock.

Other concerns regarding the switch in enterprise focus is the ability to appropriately 'manage' the sheep under pastoral conditions including:

- Understanding the impact on bush and grass of the different grazing habits
- Determining appropriate stocking rates for Dorpers

A trial was conducted on two properties in the Flinders Ranges of South Australia with the aim to measure:

- Successful containment of sheep using three different designs of electric fencing
- Ease of management of the fence
- Capital cost of fencing infrastructure (compared to conventional fencing)
- Changes in land condition and ground cover

The overall aim of the project was to Develop a management plan and protocols to successfully run hardy meat breed sheep under South Australian Pastoral conditions with the measurable objectives to:

- Increase gross margin returns from $15 DSE to $20 DSE
- Achieve a return on capital invested of at least 8% per annum
- Ensure that the rangeland health is maintained or improved by the different grazing of South African breeds (Dorpers)

Due to extreme drought conditions during the period of the trial, the outcomes of the trial have been compromised. The seasonal conditions resulted in the following management changes and observations:

- Stocking rates in each of the trial paddocks throughout the trial were below normal stocking densities
- Measuring and calculating Food On Offer (FOO) was nonsensical because the FOO when stock were introduced was below the threshold for grazing
- Calculating stock pressure on the fences was difficult as in some cases stock were not introduced into the paddock for extended grazing periods

- The escape rates measured do not necessarily equate to that which would be observed under normal grazing conditions due to the lower than normal stocking pressures on the fences

A ‘Guidelines to Best Management Practice’ has been developed as an alternative to the management plan and protocols, as there is much anecdotal evidence available, but drought conditions made it difficult to ascertain accurate results. The ‘Guidelines to Best Management Practice’ can be found on the Bestprac website at www.bestprac.info and the Rural Directions website www.ruraldirections.com.

The ‘Guidelines to Best Management Practice’ and results within this report should be taken as indicative only due to the large number of variables that were unable to be controlled throughout the trial period.

The information obtained from this trial should be more broadly tested and validated under a range of more ‘normal’ grazing conditions. The results within this trial should be seen as an indicator of general animal behaviour and performance under drought conditions, which require further investigation to determine the true potential of a Dorper meat based enterprise under rangelands conditions.

Methodology

Two properties developed and trialed fencing infrastructure for containing Dorper and Dorper cross breeds.

Electric fencing systems were trialed, using both new and existing fences with alternative live wire combinations. Tom Mugford, previously of Gallagher, was instrumental in providing advice on the most appropriate electric fencing design systems to use, considering the terrain and distance of the fences.

Paddock condition was monitored during the trial period to determine the true influence of the grazing of Dorpers on paddock health. They are known to have varying eating habits compared to merino sheep, which typically graze, while Dorpers choose to browse.

The trial commenced in March 2008, and concluded in July 2009. During this period, both properties endured significant drought periods which has ultimately affected the trial results.

Property One
Property One, Gum Creek Station, is located 15km south of Blinman in the Flinders Ranges of South Australia. The property is undulating with numerous creeks and flood ways, as well as mountain ranges. The trial paddock, 'Glen view' is 1530 ha.

Property Two
Property Two, Gum Glen, is 22km North East of Quorn in South Australia. Although relatively flat, the paddock has numerous creeks crossing which required flood gates. The trial paddock 'Sandows Paddock' is 920 ha.

Fencing Systems

Three forms of electric fencing systems were trialed.

One 5 wires; two electrified	**Two** Two electrified wires on poly droppers run at a 45 degree angle to the existing plain wire fence	**Three** 12 " offsets placed on existing wire fencing
		

Paddock Condition Monitoring

Over the project the paddock condition has been monitored using various means, to try and determine the true grazing impact of Dorpers. Monitoring has occurred on a 6 monthly basis, and used tools including

<u>General paddock condition:</u>

- The ABCD Paddock Condition Guide
- Exclosure Zones
- Photo Point monitor sites

<u>Measuring Food On Offer</u>

- Food On Offer estimates through quadrant cuts

The success of each of these tools was influenced by the drought, and a synopsis of each of the tools is given.

- The ABCD Paddock Condition Guide (as available in Responsive Grazing Management)

This tool allows the producer to rate Soil Cover, Erosion Risk, Grasses and Forbs, Recruitment, Grazing Evidence and Impact on Vegetation, Palatable/Non Palatable Species and Weeds. As well as rating the current condition of these variables, it also allows the producer to monitor the change over time in paddock condition.

ABCD Guide	All ok	Beware	Cautious	Danger
	Environment/variable is stable →			Environment/variable is declining
Soil cover (Includes grasses, mosses, rock & shrubs)	>80% cover	50%-80% cover	20%-50% cover	< 20% cover
Erosion Risk	No Erosion evident, soil is stable	Some erosion visible but currently stable	Obvious signs of current erosion and susceptibility to erosion currently high	Severe erosion present and severe erosion potential
Bush	High leaf cover and cover is 'fresh' Good levels of bush present	Leaf cover is high, but not fresh Good levels of bush present	Low leaf cover and dead bush visible Low levels of bush	No leaf cover with high amounts of dead bush visible Low levels of bush
Grasses & Forbs	High presence of grasses and forbs, both annual and perennial, productive and non-productive	Good presence of grasses and, forbs, both annual and perennial, productive and non-productive	Low presence of grasses and forbs, both annual and perennial, productive and non-productive	Total lack of any perennial or annual grasses or forbs, both annual and perennial, productive and non-productive
Recruitment	High level of young perennial plants present	Medium recruitment potential with some young perennial plants present	Low potential of recruitment, only few young perennial plants present	No potential for recruitment, no evidence of young perennial plants
Grazing Evidence and Impact on Vegetation	Low levels of grazing evident with no vegetation loss	Low levels of grazing evident with plants cropped above growing point	Moderate levels of grazing evident and some plants cropped below grazing point	High levels of grazing evident and high levels of utlisation evident on vegetation
Palatable/Non palatable	Low concentration of unpalatable species and presence is not affecting recruitment and growth of palatable species	Low concentration of unpalatable species but presence is affecting recruitment and growth of palatable species	High concentration of unpalatable species species, control method imposed	High concentration of unpalatable species little control method imposed
Weeds	Low concentration of weeds and presence is not affecting recruitment and growth of other species	High concentration of weeds but a control method is imposed	Medium concentration of weeds and presence is affecting recruitment and growth of other species	High concentration of weeds and no control method imposed

Responsive Grazing Management

- Photo point monitor sites

3 photo points in each paddock, 500m apart were set up. Photos were taken at these points every 6 months to help visually monitor the change in the paddocks.

- Setting up an exclosure zone

An exclosure zone, 1m x 1m, was set up in each paddock. This zone was not grazed, either by domestic or non-domestic animals, and it allowed us to visually determine the true impact of grazing.

- Measuring Food On Offer

Dry matter cuts were taken to estimate total Food On Offer every 6 months over the life of the project.

The methods of photo standards and photo monitoring points give an indication of paddock heath and condition, not FOO. Although the samples were taken with the use of quadrants, dried and weighed, with Chenopod land systems, these weights did not give an accurate estimation of total standing food on offer due to the numerous variables and variation within a paddock. In alternative pastoral land systems, such as grasslands, measuring total standing dry matter, through the use of quadrant cuts is a viable method as there is less variation in land systems within a paddock. We are unaware of more accurate ways to determine true FOO for South Australian pastoral conditions.

Dry matter cuts were not taken during the last two assessments of the sites due to lack of feed on offer available to be cut.

Field Days

A field day was held on August 6 2008 at Gum Creek Station. This field day included exhibits of the various breeds and their crosses being trialed, the fencing systems being trialed, anecdotal evidence to date, and best practice erection and maintenance of electric fencing systems. This field day was attended by 12 people and represented approximately 36000 DSE.

Results & Analysis

Electric Fencing

A comparison of the three electric fencing systems is as follows.

	One 5 wires; two electrified	**Two** Two electrified wires on poly droppers run at a 45 degree angle to the existing plain wire fence	**Three** 12 " offsets placed on existing wire fencing
Infrastructure requirements	Poly droppers Poly insulators 5 strand plain wire; one live one wire	Existing fence Poly spacers 2 strands plain wire	Existing fence Porcelain offsets (or alternative off sets) 3 strands plain wire
Approximate cost	$500*/km	$422/km	$605/km
Maintenance requirements	Best for maintenance and is the most robust of the options. Regular clearing of bush spec (acacia) along fence line needed	Kangaroo's can tangle the hot wire/s with fence if they are too slack and continual movement can dig the angled dropper into the ground Regular bush clearing is needed.	Kangaroos and emus can break or bend outrigger out of shape Regular bush clearing is needed
Strengths	Robust design Not as susceptible to animal tangling Hot wire is most effective	Good presentation or contact to hot wire Can be installed without having to wind up and re-run wire	Quick and easy to install on existing fence Fairly fire proof
Weaknesses	Pin-locks sometimes break under kangaroo and emu pressure Not fire proof	Poly droppers may sag with heat over time, reducing separation distance More prone to kangaroo and emu tangling Not fire proof	Susceptible to kangaroo and emu tangling Costly option
Number of escapes	Less than 5%	Less than 5%	Less than 5%[#]

*based on extra cost to install in existing fence
Some escapes were a result of flooding which washed out flood gates

Base standard equipment required:

- Energiser
- Earth
- Outrigger or offset
- Active (live) wire

The following points have been noted in regards to maintaining electric fencing:

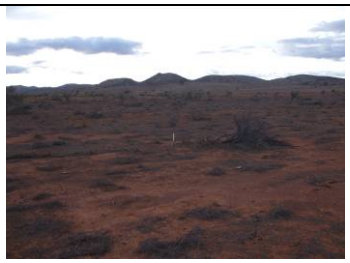
- Acacia victoriae and some tall weeds may need to be controlled along the fence
- Outrigger wires can get caught on the bottom of main fence spacers caused by roo's getting through
- Auxiliary electric wires at creek crossings need to be very strongly clamped to the main wire because of roo movements

Photo Points
3 photo points were established in each paddock, both trial and monitor paddocks. Photos are a useful media to monitor the change as the subtle changes can not otherwise be easily detected.

Photo points were established 500m apart and their positions randomly selected over each paddock. It was important to establish more than one photo point to show the grazing habits of the sheep over the entire paddock.

Gum Glen Trial Paddock	**S 32 14.055” E 138 13965”**	**S 32 13.954” E 138 14.254”**	**S 32 13.842” E 138 14.615”**
May 08			
November 08			
May 09		Photo Unavailable	Photo Unavailable

Gum Glen Monitor Paddock	S 32 14.086” E 138 13.370”	S 32 14.106” E 138 13.063”	S 32 14.139” E 138 12.732”
May 08			
November 08			
May 09			

Gum Creek Trial Paddock	S 31 10.440” E 138 42.237”	S 31 10.319” E138 42.508”	S 31 10.106” E 138 42.657”
May 08			
November 08			
May 09			

Gum Creek Monitor Paddock	S 38 10.836” E138 41.462”	S 31 10.822” E 138 41.547”	S 31 11.104” E 138 4.257”
May 08			
November 08			
May 09			

As the photos show, drought has caused a general decline in paddock condition, but seasonal rain has also enhanced food on offer at particular times during the project. In some instances, sheep were returned to the paddock during these times, and in other instances, the paddock was allowed to rest.

The photos do not conclusively show any difference in grazing habits between merino and Dorpers because normal grazing practices could not be employed. An extended trial period would be required to show the true impact in these known different grazing habits over time across a range of seasons.

Drought conditions have severely affected paddock conditions, and the periodic stocking of the paddocks makes it difficult to determine the impacts of domestic grazing from non-domestic grazing. Due to the general lack of feed in all four paddocks, all feed sources were generally grazed as feed on offer was scarce.

Exclusion Zones

Exclusion zones, 1m by 1m were set up in each paddock. These exclusion zones were designed to show differences between grazing and no grazing, and exotic grazing and no grazing, and merino grazing and no grazing.

	January 08	May 08	November 08	May 09
Gum Glen Trial Paddock	Photo Unavailable		Photo Unavailable	
Gum Glen Monitor Paddock				
Gum Creek Trial Paddock		Photo Unavailable		
Gum Creek Monitor Paddock				

The exclusion points show the difference between Total Grazing Pressure and no grazing pressure in each of the paddocks. Again, it is difficult to draw any real conclusions in grazing habits between the trial and monitor paddocks with the data shown in the exclusion points.

There is evidence that the areas within the exclusion zone had increased recruitment of grasses, better bush condition (more fresh bush and more growth) and more ground cover, which decreased erosion potential.

However, Total Grazing Pressure was not measured in the project, and therefore, it is difficult to ascertain the grazing impact from domestic (Dorpers) versus non-domestic stock (goats, rabbits, macropods), and the impact on land condition that non-domestic stock exerted whilst the paddock was de-stocked from domestic stock.

In future trials, it will be necessary to monitor the Total Grazing Pressure to accurately determine the difference in grazing pressure exerted by exotic sheep as opposed to merinos.

Food On Offer

Food On Offer measurements commenced with project startup, but no measurements were taken following the November 2008 data collection due to the lack of dry matter available for measurements.

The results obtained from the two collections were not considered to be a true measurement of the total feed on offer in the paddock. External advice was sought and suggested that due to season and the large variability in land condition and land systems within the paddocks, the quadrant cut method was an inaccurate method of estimating FOO.

ABCD Guide

The ABCD guide has been used to observe a range of paddock condition variables over the life of the project. The table below summarises the observations made using the ABCD guide. There was no significant differences shown between the trial and monitor paddocks for each property, and hence, their observations have been combined.

	Gum Creek Station	**Gum Glen**
	Trial Paddock *Monitor Paddock*	*Trial Paddock* *Monitor Paddock*
Soil Cover	At the commencement of the project, soil cover was around 50%, but this decreased to around 20% by the end of the project. Drought conditions heavily impacted on the cover levels present	Soil cover varied from between 20-50% over the life of the project.
Erosion Risk	Ranged from low to medium erosion risk over the life of the project, as soil cover was reduced	Erosion risk was generally low, with some erosion visible, but controlled.
Grazing Evidence and Impact on Vegetation	Medium to high levels of evidence of grazing was noticed, with moderate to high utilisation of feed on offer throughout the period.	A general lack of perennial grasses and forbs during the trial period, with moderate to heavy levels of grazing evident.

As there were no significant observations shown between the trial and monitor paddocks at either property, it could be concluded that the exotic animals did not detrimentally affect the land condition when compared to the merino breed. However, extreme drought conditions, which resulted in severe destocking of each property, has impacted on the true results of this trial. Therefore, it can not be concluded that there are or are not detrimental land issues when running an exotic breed enterprise, as both properties destocked according to climatic conditions.

Key learning's by Producers

The following comments are quotes from participating businesses, Bill and Jane McIntosh and Dean and Penny Hooper and are opinions based on observations during the trial.

"The project aimed to achieve objective production information as well as assessments of fence performance and impact on natural resources. Some of this information proved difficult to obtain given the management difficulties and various distortions created by extreme drought conditions. Production and profitability are probably best measured over longer periods of time and in a greater range of seasonal conditions.

Flock and photo point monitoring, along with discussions with other producers instigated by the project have supported the following key learning's:

1. Dorper survivability in drought is exceptional
2. Due to a number of factors, the trial did not show any marked difference in grazing habits between Merino's and Dorpers. However it was observed that the grazing habits of Dorpers are different to Merinos and needs to be managed within the long term stocking rates
3. Fencing is not the only answer to the containment issue and should be seen as just part of the 'containment plan' approach. Also paying attention to adequate feed, shade, water quality, 'centre of paddock' water placement, fence education, breed purity and removal of rogue individuals is critical
4. Achieving 'pure breed' status is an important factor in achieving containment, operational efficiency and economic profitability
5. Dorpers can be contained with electric fencing, providing the electric fence is well maintained and the sheep have enough Food On Offer in the paddock
6. Unless a dedicated sheep-proof ram paddock is devised for rams, it is easier to manage the rams with the ewes year round

The effect of the extreme drought conditions that happened to coincide with the project time frame did limit our ability to obtain detailed production figures and manage the flock to the degree that this would have required. However, observations would suggest the following:

- There is no significant difference in the number of escapes observed between the three fencing options
- There are differences between fence designs in regards to cost and maintenance requirements. Individual circumstances will dictate the most appropriate fencing design for each situation

Anecdotal evidence from the trial suggests:

- There is subtle differences in Dorper behavior with purer crosses appearing to stray less
- Dorpers have a different grazing habit to a Merino
- Running a Dorper enterprise in the rangelands is a viable option

Key habitual practices have also been noted in flocks run in the Western Districts of New South Wales. Anecdotal evidence from this area suggests similar findings to Bill McIntosh, in that pure breeds are less likely to 'wander' and are more territorial than cross breeds. Breeding experimentation has also found that crossing a Dorper with a Damara also reduces the 'wandering' habits."

Economic Impact
"During the trial, a lambing percentage of 100.3% was obtained despite prevalence of the driest conditions known to present management. Trade lambs were produced and sold reaching weights of between 20-35kg dressed, depending upon age. Generally, lambs were sold in the 21-23kg dressed range. Clearly, these results could not have continued indefinitely in such drought conditions as the sheep were cleaning up a last reserve of weed and other palatable vegetation.

However, assuming a return to normal (or even near normal) seasons and pasture conditions, it can be reasonably assumed that a quite reliable and profitable production system could be established, provided it is based on a conservative stocking rate. Even in normal seasons a stocking rate that is set too high could quickly run down pasture and land condition given the grazing ability of the Dorpers. It is considered that the ideal strategy would be a very conservative stocking rate matched with continuous mating as a compensating boost to productivity. The more even level of pasture availability achieved through very conservative stocking rates is a key element of the 'containment plan' through reinforcement of their territorial tendency which appears to be very strong when conditions are good.

I think there is some economical advantage from the trial work, showing that running a Dorper flock is a profitable alternative to a Merino flock. However, if a Merino flock is to be run in conjunction with a Dorper flock, all efforts to prohibit contamination must be enforced, or significant losses could result due to the discounts on the Merino wool."

Environmental Impact
"Environmental benefits of project outcomes are that the rangeland condition is protected and maintained despite the superior hardiness and grazing ability of the Dorpers. The importance of very conservative stocking rates has become very clear with indications that at least a 30% reduction on considered merino stocking rates may be necessary.

It is also likely that at these lower rates, Dorpers may have less impact at ground level, enhancing ground cover and reducing erosion risk, through their tendency to graze less selectively, trimming higher vegetation to a greater degree than merinos, for example. This need not have a detrimental effect on low trees and bush if impact is at the lower end of the scale.

I did not observe any real environmental benefits of running a Dorper flock in comparison to a Merino flock, which also indicates that we did not observe any detrimental environmental effect from the Dorper flock. However, the stocking rate of the Dorper mob was reduced to ensure environmental sustainability. This is the key to running a Dorper flock; ensure continuous monitoring and adjustment to stocking rates that reflect the feed availability.

It must be noted that this trial was conducted over a 2 year period, which is a relatively short time frame to accurately monitor changes in a landscape and environment. Although no detrimental effects were shown when comparing the grazing habits of Dorpers and merinos in this trial, longer term impacts of the differing grazing style could be evident."

Key Changes
"The key practice changes that have been implemented as a result of the project include:

- Disposal of F1, F2 and F3 cross ewes at earliest opportunity
- Electrified wires kept closer to the ground for greater effect
- Ewes continuously mated for greater productivity
- Continued monitoring and maintenance of the electric fencing to ensure it is in constant working order
- Continuous monitoring and evaluation of paddock condition, maintaining sheep numbers at a level to ensure there is always more than adequate food available
- Ensure Dorper flock is quarantined from the Merino flock, both in yards and shearing shed

Key practices changes that are planned for future implementation by Producer One include:

- Long term stocking rates for Dorpers to be set 20-30% lower than for Merinos due to observed differences in grazing habits
- Establish a 'containment plan' approach to containment
- Running a pure Dorper flock with no Merino's

"The trial proved to be successful as the sheep were contained successfully with no adverse environmental effects observed. We were required to lower the stocking rate in the trial paddock, and this enabled a good level of vegetation cover to be maintained, despite low annual rainfalls."

Key practices changes that are planned for future implementation by Producer Two include:

- Continuing to run a Dorper X Merino flock, and a Merino x Merino flock. provided the Dorpers can continue to be contained and not impact on the Merino enterprise

"I was quite satisfied with the results of the project because it actually encouraged us to observe much more closely changes to land condition and patterns of sheep behaviour, both through interaction with the consultants and networking with other producers."

Recommendations for Future Trials and PIRDS

"Future trial work would be useful and worthwhile. A possible area of investigation would be developing the best marketing strategy for pastoral Dorper lamb (e.g. sell as suckers, older heavy lamb or as feeder lambs to inside country).

I would recommend involvement in this sort of trial because it encourages learning and observation. Trying new ideas in a group environment always enhances the value of the results."

Summary - Assessment of Results Against Project Aims

The aim of the project was to d*evelop a management plan and protocols to successfully run hardy meat breed sheep under South Australian Pastoral conditions*. Project achievements can be assessed against the measurable objectives of the project:

- Increase gross margin returns from $15 DSE to $20 DSE (ie financial gain is achieved).

Due to the extremely poor seasonal conditions encountered over the life of the project, it was difficult or impossible to quantify the financial gains of a Dorper enterprise compared to a merino based enterprise that has been run in typically 'good years' historically.

Gross Margins have been developed based on 'normal' stocking rates.

However, it was observed from the sales of some Dorper lambs that they were adequately finished for market under drought conditions. Under the same seasonal conditions, it was not expected that merino lambs would have put on sufficient condition for sale. Hence without being able to quantify the financial gain achieved from running Dorpers, it is expected that when run in similar conditions to merino's, they will perform better with regard to breeding (percentage received) and finishing (meeting market needs).

- Achieve a return on capital invested of at least 8% per annum

  The investments in fencing were $422/km, $500/km and $605/km, depending on the type of fence used. The capital investment includes the cost of the energizer, offsets, live wire and earth. Based on the $500/km fence option and a stocking rate of 16 sheep/ km^2, if the financial gain of $1.91/DSE was achieved in the project (as indicated by the Gross Margins calculated (Appendix Two)), this would have provided a return on capital of (16 x $1.91) /$500 = 6%. This return is below the 8% that was the project target.

  Again, drought conditions makes it difficult to ascertain the true gross margin achievable with a Dorper enterprise and that achieved within the project. It was observed that under drought conditions, a Dorper enterprise can still be profitable if managed correctly, and the manager/producer responds to seasonal conditions.

- Ensure that the rangeland health is maintained or improved by the different grazing of South African breeds

  One of the key messages from the project was that when appropriately managed, Dorpers offer no more problems to the environment than merinos. This is not to say that the management is the same, as it appears that Dorpers will persist under conditions in which merinos would perish. The producers involved in the trial responded to this by reducing stocking rates of the Dorper enterprise, compared to the merino enterprise, by approximately 20%.

  Dorpers appear to browse to a higher level and eat a wider range of herbage than merinos. They are also prepared to forage as widely as is required for food. The issue of containment is just one of the factors that needs to be considered for appropriate management. When seasonal conditions are poor, continued grazing will degrade the grazing system and destocking is required. This practice was implemented in the project due to poor winter rain, failed growth of annuals due to the lack of winter rains and low levels of cover.

  Therefore, it can be concluded, that with appropriate management and responsiveness to seasonal conditions, the grazing of Dorpers does not detrimentally effect rangeland health and condition any more or less than a merino based enterprise. It has been shown that the key to ensuring rangeland

health is maintained or improved is underpinned by the management skills of the producer, rather than the grazing habits of the animals.

Conclusions

This trial has allowed for numerous findings on managing exotic sheep breeds in pastoral conditions to be determined. The producers involved believe that these findings, although useful, are just the beginning of the exploration of successfully managing these sheep breeds under pastoral circumstances to create a profitable business model.

The key findings and conclusions from this project are:

- Electric fencing can successfully contain Dorper sheep
  If erected according to standards and maintained accordingly, electric fences can be effective. There did not appear to be any significant differences in the effectiveness between the three fence types tested. There were maintenance and cost differences noted. The choice of the most suitable fence type will be determined by local conditions.

- A full containment plan should be executed
  A full containment plan that incorporates fencing, watering, monitoring land condition and feed on offer should be implemented to successfully contain the breed within a given paddock, rather than purely relying on fencing options.

- Management differs to Merino sheep
  The management of Dorper sheep differs to Merino sheep, particularly in regards to grazing management. Generally, stocking rates were 20-30% less in Dorper sheep compared to Merinos, due to their differing grazing habits. To compensate the 'production loss', ewes were continuously mated during a 12 month period.

- Running a Dorper flock can be profitable
  If managed correctly and under 'best practice', a Dorper flock can prove to be a profitable enterprise in the pastoral country. The gross margins that were calculated at the beginning of the project indicate that a Dorper flock can be as profitable or more profitable than a Merino flock if managed appropriately. Infrastructure costs need to be considered when establishing the enterprise. There are alternative containment methods that can that incur differing costs.

- Grazing habits are not necessarily detrimental to the environment in the short term
  It must be noted that this trial was only conducted over a 2 year period, and therefore no direct conclusions can be drawn on the long term impact of the grazing habits of Dorpers and their effect on the environment. However, in the short term, if stocked appropriately, their grazing habits do not seem to pose any detrimental effect on the environment.

Dorpers offer a range of benefits over merinos, including:

- No requirement to crutch or shear F4's or higher
- High fecundity and fertility
- Ability to thrive in harsh conditions.

Like all sheep, Dorpers need to be appropriately managed to achieve good economic performance and to prevent environmental degradation. Merinos will undergo loss of condition in conditions in which Dorpers will continue to breed and produce saleable

lambs, but the environment will suffer. Hence, suitable rainfall, soil cover and vegetation monitoring systems need to be implemented to ensure that overgrazing does not occur. In harsh seasons, destocking will need to occur.

Future Trials and Exploration

There is still much work to do in regards to fully understanding the habits of Dorper sheep in the rangelands. Long term trial work that closely monitors environmental impacts of the different grazing habits would give useful data on the impact of the animals after a prolonged grazing period.

Further work should also be conducted on the preferred grazing habits of the animals, to determine which plant species are being selectively grazed, as this could impact on the long term management of their grazed environment.

Future work could also revolve around finding the most appropriate 'finishing' system for the animals, and determining if grain feeding finishing is required, or if grazing can be adequately achieved for the same cost benefits.

Appendix One: 'Guidelines to Best Management Practice'

Appendix Two: Gross Margin Analysis

The following Gross Margin analysis were developed by members of various Bestprac groups from South Australia who have knowledge and experience in managing both Merino and Dorper enterprises.

These Gross Margins were further verified at the field day held for the project 'Management Systems for Hardy Sheep Breeds in Pastoral Conditions.

These Gross Margins are based on the following assumptions:

- Seasonal conditions allow for 'normal' stocking rates of 0.2 DSE/ha
- Sale of animals occur at normal management times and are not forced sales due to drought conditions
- The most appropriate management techniques are used in each enterprise
- The production figures are those most likely obtained in the Flinders Ranges of South Australia

Dorper Flock

- The stocking rate is 0.165 head/ha or 0.2 DSE/ha
- The Dorper flock has a higher fecundity level than a Merino, with a lambing percentage of 120%
- The stocking rate is sustainable
- The flock is based on F4 purity and hence require no mulesing, shearing or crutching
- A premium for lamb sales is achieved over the Merino flock due to the ability to better 'finish' the lambs
- A mature Dorper ewe has a DSE rating of 2

Merino

- The stocking rate is 0.162 head/ha or 0.2 DSE/ha
- Standard wool cuts are achieved (as recommended by group members)
- A lambing percentage of 85% is achieved
- A mature Merino ewe has a DSE rating of 1.7

GROSS MARGIN ANALYSIS - SHEEP

Self Replacing Merino

Flock Structure	Numbers		Wool Cut kg/head	Total Kg	Total DSE
Ewes (Age_____y.o.)	700	@	6.5	4,550.00	1190
Wethers		@	7	0.00	0
Hoggets	180	@	5.5	990.00	216
Lambs	560	@	2.5	1,400.00	280
Rams	18	@	8	140.00	35
Other		@		0.00	0
Total	1458		Total	7,080.00	1721

Income	Quantity		Unit Price	$ Total Dollars $
Wool	**Kilograms**		**$/kg**	
Fleece (AAAM)	7,080.00	@	$4.50	$31,860.00
Fleece (other)		@		$0.00
Lamb	0	@	$1.50	$0.00
Locks	0	@	$1.80	$0.00
Bellies	0	@	$2.20	$0.00
Total	7080		Wool Total	$31,860.00
Stock Sales	**Number**		**$/head**	
Ewes	160	@	$45.00	$7,200.00
Wethers	0	@	$55.00	$0.00
Hoggets	0	@	$50.00	$0.00
Lambs	361	@	$40.00	$14,440.00
Rams	3	@	$30.00	$90.00
Other		@		$0.00
Total	524		Stock Sale Total	$21,730.00
			Total Income	$53,590.00

Expenses: Variable Costs					
Item	**Number**		**Cost/unit $**	**Unit**	**Total $$**
Shearing	1528	Sheep@	$480.00	/100	$7,334
Shed Labour	6	Days@	$130.00	/day	$780
Wool Packs	38	Packs@	$10.00	/pack	$383
Shed Sundries	$100			/head	$100
Dipping	1458	Sheep@	$0.40	/head	$583
Crutching	1458	Sheep@	$140.00	/100	$2,041
Veterinary	$100	Sheep@	$0.00	/head	$100
Drench		Sheep@		/head	$0
Mulesing	560	Lambs@	$0.70	/head	$392
Purchases					
Ewes		Sheep@	$60.00	/head	$0
Wethers		Sheep@		/head	$0
Hoggets		Sheep@		/head	$0
Lambs		Sheep@		/head	$0
Rams	4	Sheep@	$500.00	/head	$2,000
Other		Sheep@		/head	$0
Freight					
Buying	4	Sheep@	$30.00	/head	$120
Selling	524	Sheep@	$3.50	/head	$1,834
Wool	38	Bales@	$8.00	/bale	$306
Selling Charges					
Commission					
Selling	9.00%	% of Proceeds			$1,956
Wool	3.00%	% of Proceeds			$956
Yard Fees		Head@		/head	$0
Fodder	$1,000.00		$0.69	/head	$1,000
Water	$1,000.00		$0.69	/head	$1,000
Fuel	3000	km/year		$/km	$3,000
Agistment		head@		/head	$0
Labour	12	days@	$200.00	/day	$2,400
Other				/head	$0
Other				/head	$0
Total hectares used	9000	/year	0.19	DSE/ha	
				Total Variable Costs	$26,284.26

Gross Margin	
per flock	$27,305.74
per Hectare	$3.03
per DSE	$15.87
per head	$18.73

GROSS MARGIN ANALYSIS - SHEEP

Self Replacing Shedding Sheep - Pure Dorper (F4)

Flock Structure	Numbers		Wool Cut kg/head	Total Kg	Total DSE
Ewes (Age____y.o.)	610	@		0.00	1220
Wethers		@		0.00	0
Hoggets	130	@		0.00	182
Lambs	732	@		0.00	293
Rams	15	@		0.00	31
Other		@		0.00	0
Total	1487		Total	0.00	1725

Income	Quantity		Unit Price	$ Total Dollars $
Wool	**Kilograms**		**$/kg**	
Fleece (AAAM)	0.00	@		$0.00
Fleece (other)		@		$0.00
Lamb	0	@		$0.00
Locks	0	@		$0.00
Bellies	0	@		$0.00
Total	0		Wool Total	$0.00
Stock Sales	**Number**		**$/head**	
Ewes	160	@	$45.00	$7,200.00
Wethers	0	@	$55.00	$0.00
Hoggets	0	@	$50.00	$0.00
Lambs	590	@	$65.00	$38,347.40
Rams	3	@	$30.00	$90.00
Other		@		$0.00
Total	753		Stock Sale Total	$45,637.40
			Total Income	$45,637.40

Expenses: Variable Costs					
Item	**Number**		**Cost/unit $**	**Unit**	**Total $$**
Shearing	0	Sheep@	$480.00	/100	$0
Shed Labour	0	Days@	$130.00	/day	$0
Wool Packs	0	Packs@	$10.00	/pack	$0
Shed Sundries	$0			/head	$0
Dipping	0	Sheep@	$0.40	/head	$0
Crutching	0	Sheep@	$140.00	/100	$0
Veterinary	$100	Sheep@	$0.00	/head	$100
Drench		Sheep@		/head	$0
Mulesing	0	Lambs@	$0.70	/head	$0
Purchases					
Ewes		Sheep@	$60.00	/head	$0
Wethers		Sheep@		/head	$0
Hoggets		Sheep@		/head	$0
Lambs		Sheep@		/head	$0
Rams	2	Sheep@	$1,000.00	/head	$2,000
Other		Sheep@		/head	$0
Freight					
Buying	4	Sheep@	$30.00	/head	$120
Selling	753	Sheep@	$3.50	/head	$2,635
Wool	0	Bales@	$8.00	/bale	$0
Selling Charges					
Commission					
Selling	9.00%	% of Proceeds			$4,107
Wool	3.00%	% of Proceeds			$0
Yard Fees		Head@		/head	$0
Fodder	$1,000.00		$0.67	/head	$1,000
Water	$1,000.00		$0.67	/head	$1,000
Fuel	3000	km/year		$/km	$3,000
Agistment		head@		/head	$0
Labour	5	days@	$200.00	/day	$1,000
Other				/head	$0
Other				/head	$0
Total hectares used	9000	/year	0.19	DSE/ha	
				Total Variable Costs	$14,962.73

Gross Margin	
per flock	$30,674.67
per Hectare	$3.41
per DSE	$17.78
per head	$20.63