



final report

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Finishing livestock under centre pivot irrigation

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Abstract

There are large amounts of irrigated land (generally centre pivot) in Tasmanian that are suitable for the production red meat. These areas have only recently been irrigated for cropping purposes however the soils in the region are not robust and as a result long rotations between cropping phases are necessary. Traditionally the irrigation infrastructure has been moved to a new site after cropping has finished, the pasture is sown down and the pasture returned to a dryland state. A number of farmers have expressed an interest in running livestock (beef and lambs) under these irrigation systems but are not convinced that they are profitable.

The farmers considering these opportunities want to know that the systems can be profitable, can be run on a large scale and will not compromise the environment. The majority of irrigated or high rainfall production systems in Tasmania are not characterised by scale and as a result were to some extent deemed irrelevant.

Rather than set up a large scale trial to address the concerns of these producers it was decided that it may be better to conduct a study tour to South Australia, where large scale irrigated (pivot) red meat production systems have existed for a significant period of time.

The study group discovered that despite having the infrastructure to run large mobs under pivot irrigation this was not generally occurring in South Australia. In fact a number of members in the study group were already running larger mobs than the producers visited in South Australia. The key learning from the trip was that it is ultimately management of the fodder base (particularly pasture management) that will determine profitability and any work carried out in Tasmanian to look at management of scale must incorporate best management practice in the area of pasture management.

The study tour concluded that managers in South Australia are struggling with many of the same issues that are faced in Tasmania. That further work should be undertaken to look at best management pasture principles can be implemented at scale. The study group would be very keen for at least part of this work to be hosted in Tasmania and recognise that it has much broader application than just Tasmania.

Executive Summary

- There are significant areas of land in Tasmania that are suitable for the production of red meat from irrigated pastures. Many of these areas have been cropped and are in need of a pasture based enterprise that can be profitable during the break period between crops. Where irrigation infrastructure is in place many producers are choosing to leave it idle rather than run livestock because they believe that they are not profitable.
- The finishing livestock under pivots study tour was undertaken to determine whether the production constraints currently perceived by Tasmanian producers are similar to those being experienced in other states.
- The objectives of the study were:
 - Visit farming operations in the Penola/Naracoorte regions of South Australia to scope out and report on the logistics and infrastructure requirements for finishing large mobs of livestock under irrigation (in particular centre pivots).
 - Use the results to inform producers of potential management strategies that can be implemented and/or develop a project to establish best practice management strategies for finishing stock using irrigation (but specifically centre pivots).
 - Workshop the technical aspects of livestock systems under irrigation using the cost of production calculator with a local consultant and invited local farmers to determine the key drivers of profit and to determine whether there are any key differences that mean that Tasmania producers should not finish cattle and lambs on irrigated pasture.
 - If the issues that are perceived by Tasmanian producers as limiting the profitability of lamb and cattle finishing systems have not been addressed by South Australian producers then, recommend the development of a project that addresses these issues.
- South Australia has a long history of the production of beef and sheep meat under irrigation (particularly centre pivot irrigation) and was deemed an appropriate place to look for possible solutions to the issues faced by Tasmanian producers. It was decided that this was a low cost, low risk opportunity that could be undertaken to see if there were answers in other areas that had a longer history of irrigation for finishing red meat animals. If the answers were not available then a project to address these issues could be recommended or developed.
- The trip revealed that the South Australian farmers faced many of the same issues that the Tasmanian farmers face particularly with respect to the challenges of running large mob sizes on irrigated pastures.

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- While the trip revealed many interesting facts and raised many issues and potentials for productivity increases these were not, in general specific to the issues that the group went to South Australia to address.
- As a result it is the recommendation of this report that MLA sponsor a project looking at how best management practice can be implemented at scale in irrigated red meat finishing systems.

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1 Background

A major opportunity exists to increase lamb and beef production in Tasmania. There is an abundance of water and irrigation infrastructure which could be used to produce pastures and crops for finishing stock. Currently there are significant barriers to producers pursuing this opportunity due to questions associated with the logistics of stock movement (particularly very large mobs of 500 cattle or 1000 lambs), the infrastructure required (other than irrigation infrastructure), resources and the economics on how to do this profitably. There is currently limited or accessible information available on how larger producers can successfully implement systems for finishing large numbers of sheep and cattle under centre pivot irrigation.

There are two distinct groups of producers across the groups involved in this project that are in a particularly good position to capitalise on this opportunity. The first is those who are successfully cropping with irrigation but need to have a profitable irrigated pasture system integrated into their crop rotation to protect the fragile soils that are common to these areas and; secondly, those producers who were cropping, have the infrastructure and access to water but have their pivots idle because they believe that the profitability of livestock systems cannot justify the use of irrigation. The interest in the producer groups involved in this project demonstrates their willingness to build their capacity to capture any potential increase in productivity and profit through effective use of their irrigation infrastructure.

To commence investigations into the opportunities for increasing lamb and beef production under irrigation a study tour to scope the challenges, infrastructure and logistics was deemed appropriate to provide insight into management and systems function, or to provide input into the design of a project that would establish best practice management for finishing lambs and beef under centre pivot irrigation. This is a particularly timely project, given the future opportunities in the Tasmanian Water Plan.

2 Project Objectives

The aim of this project is to:

- i. Visit relevant producers in South Australia to scope out and report on the logistics, management and infrastructure requirements for finishing large mobs of livestock under irrigation (in particular centre pivots).
- ii. Use the results to inform Tasmanian producers of the management strategies that can be implemented and/or develop a project to establish/demonstrate best practice management strategies for finishing cattle and lambs using irrigation (but specifically centre pivots).
- iii. Workshop the technical and profit aspects of these systems with a local consultant and invited farmers to determine the key profit drivers.

- iv. If required, develop a plan of logistical and infrastructure requirements to conduct a commercial sized study into best practice management requirements for finishing large mobs of stock under irrigation (centre pivot).

The size of the group was deliberately kept small in order to gain facts for the input into a bigger project rather than a study tour per se.

3 Methodology

3.1 Sourcing contacts and locations of leading producers

A program of the most appropriate producers and locations to visit was developed in conjunction with MLA PDS Co-ordinator Gerald Martin. Locations and producers were selected on the following criteria:

- Six properties were visited. They were located in a region where irrigation (pivots) was used for both cropping and livestock production
- Properties visited were operating on a large scale with large mobs of lambs and/or cattle on irrigated pastures
- The opportunity existed to see the system in action, where the logistics of managing the system could be easily observed and discussed with the owners or managers
- The producers visited were willing to share their experiences and challenges and be open to further input into any subsequent project developed

A travel itinerary was developed with clear objectives for each site visited (Appendix 1).

3.2 Scoping study

The farmer and DPIW representatives conducted a scoping study by attending all the locations in the itinerary. Critical to each visit was the opportunity for the group representatives to see the irrigated grazing system in operation. A report for each site visited was completed, providing a summary of the business, key infrastructure and resources required for the finishing system, key logistical considerations and the major challenges to the system with solutions that had been implemented to overcome these problems.

3.3 Report on the outputs from the scoping mission

Each of the site reports was consolidated to form the basis of this final report. Recommendations on aspects to be included in any project were provided. In addition to this the group conducted a facilitated meeting with local farmers to look at the economic considerations of turning off lamb on irrigated pastures. Support to complete this report was provided by Davey and Maynard.

3.4 3.4. Presentation to the Waterhouse & Hagley groups

The final report and subsequent project design (if required) will be presented to each of the Waterhouse and Hagley groups. The groups will review the proposal for the project and have an opportunity to provide input into the final design.

3.5 Development and submission of large scale project

The report, incorporating the results of the scoping study and group input will be submitted to the Red Meat Targets Program Committee for consideration for funding.

4 Results and Discussion

4.1 Background

The primary purpose of the study tour was to learn from other farmers with similar farming systems. Of particular interest was whether or not South Australian farmers had been able to overcome the issues associated with running large mobs of lambs and cattle within irrigated systems. If they had then it would be a simple matter for Tasmanian producers to implement these management strategies and technologies on their own farms and to secondly promote their use through field days and workshops.

As outlined in the previous sections, it was evident that the producers participating in the study tour learned a great deal about grazing under centre pivots. However, there were a number of factors that limited the achievement of the overall objectives. Firstly, the area visited had received 100mm of rainfall earlier in the month and a number of the farms visited had sheep and cattle running on green dryland feed in preference to running them under their centre pivots. While this is entirely understandable it did mean that the tour group were unable to see firsthand the logistical management requirements for animals moving between paddocks and grazing under the pivots on a number of farms.

Typically the areas had received good rains prior to the trip



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Secondly, on a whole the South Australian farmers visited on the tour were running higher stocking rates and mob sizes than the Tasmanian average, but similar to the Tasmanian producers in the tour group. This limited discussion on how to intensify stocking rates, increase mob size and maximise productivity using irrigated grazing systems.

Thirdly the tour group found that many of the challenges that they are facing in terms of understanding how to profitably manage large mobs at high stocking rates are similar to those in South Australia. As a result many of the significant issues and problems that the group were hoping to address remain unsolved. The lack of objective data (monitoring of liveweight gains, economic and profit information) to substantiate the benefits of implementing irrigated grazing systems also limited the findings of the study tour. However there were a number of issues that did challenge the tour group.

4.2 Stocking rates

The stocking rates were generally very high on the properties visited (but similar to those in the study group). They ranged between 30 and 40 DSE/ha . At the higher end, these stocking rates are much higher than those generally run in Tasmania and as a result the producers felt that there is a lot of scope to increase stocking rate in Tasmania (on average).

The highest stocking rate was run on a property where a consultant made 3-weekly visits and set the grazing rotations and post grazing residual. These factors were seen by the owner as crucial in achieving the high growth rates experienced.

Grazing management was seen as a key factor in the productivity and profitability of the irrigated systems being run in South Australia. The producers visited had, on the whole, a high degree of skill in intensive grazing management.

4.3 Animal growth rates

Lambs finished under centre pivots were growing at rates between 250 and 400 gms/day which is similar to that which the better producers are achieving in Tasmania. Probably the most significant difference was that these growth rates were being achieved at significantly higher stocking rates than in Tasmania.

Cattle were achieving growth rates of in excess of 2 kg lwt/day and terminal weights of 640 kg. To achieve these very high growth rates there was a leader-follower system being employed, where chopper cows were running behind the finishing mob to remove excess pasture and maintain pasture quality.

4.4 Animal production

Production on a per hectare basis was well above the Tasmanian average but similar to that of the top producers in Tasmania. From what could be ascertained from the producers. It appeared that the best of the farms visited were turning off approximately 1050 kg liveweight lamb/ha and 1400 kg liveweight beef/ha. Again pasture management was singled out as a key driver of this performance.

A number of the South Australian producers had issues with lambs getting too big. This is an issue that can lead to major inefficiencies at the whole farm level because oversized lambs realised a lower price despite having eaten a lot more feed (particularly as maintenance) to finish.

4.5 Mob size

One of the primary objectives of the study tour was to see how South Australian farmers coped with larger mobs. Larger mobs would be a lot more efficient from a labour management and infrastructure point of view. It appears that the South Australian producers had not come to terms with this. Relatively small mobs (although probably bigger than average) were being run (500 lambs, 200 cattle). The farmers felt that these were about as big as they could go without compromising animal performance but there did not appear to be any evidence behind this opinion.

A number of the Tasmanian producers were already running mobs significantly larger than those that were being run in South Australia. In addition to this they were achieving similar growth rates per animal. The lack of farmers running big mobs meant that it was not possible to see the physical impacts and management requirements. The infrastructure requirements were able to be observed however and are discussed later.

4.6 Fertiliser requirements and application

The fertiliser requirements of the pastures grown under centre pivot irrigation were similar to those in Tasmania, apart for the differences expected due to soil type and base fertility. The South Australian producers had a more aggressive approach to the use of nitrogen and the number of applications of phosphorus and potassium fertiliser.

Many of the soils in Tasmania are light and as a result may benefit from multiple applications of phosphorus and potassium fertiliser. In addition to this, Tasmanian producers that choose to run sheep and cattle on irrigated pastures could benefit from a more aggressive approach towards the use of nitrogen.

4.7 Infrastructure requirements

4.7.1 Fencing

The fencing requirements for lambs are substantially greater than for cattle. Most of the properties visited were using electric fencing under the pivots which consisted of either 3 wires (2 electric and one earth wire) or 4 wires (2 electric and 2 earth wires).

In most cases the number of paddocks was small under each pivot. Generally they ranged from 5-10 paddocks. This was a reasonable fit with the 15-20 day grazing rotations during the finishing period. However there may need to be substantially more paddocks in Tasmania where growth rates are slower through this period and there would be longer rest periods required. This would be particularly so if mob sizes could not be significantly increased.

Typical fencing – low cost and effective



The tour group felt that the issues associated with fencing could be overcome using the fences that were seen. In most cases they involved large distances between plastic pegs that would bend over and stand back up as the pivot wheels passed over.

4.7.2 Water systems

A variety of watering systems were observed from moveable plastic systems to permanent concrete systems. Most of the tour group felt that the temporary systems had merit because of the ease with which they could be removed to permit cropping.

Permanent water system



4.7.3 Yards

A point that was made by a number of the SA farmers was that as mob size increased it became increasingly important to have yards located near the grazing area. Again portable yards were seen as most appropriate because they could be moved from one pivot to another as they were required, or as the pivot was shifted from one area to another. Again with large mobs is important to be able to regularly draft saleable animals but without moving the entire mob large distances which would have the potential to compromise liveweight gain.

4.8 Fodder base

The fodder base used by South Australian producers was much more diverse than in Tasmania. The members of the tour group were exposed to a number of species that may be suitable to Tasmanian conditions. In many cases the focus on different species was due to water use efficiency. It is likely that this will become an increasing motivator to consider alternatives to perennial ryegrass and white clover pastures in Tasmania in the future.

Diversity in the fodder base was common



4.9 Fodder and pasture management

The tour group were extremely impressed with the commitment to pasture management demonstrated by the producers that were visited. A number of the SA producers were using agronomists or other professionals to help with their decision making and general management of the feed base. In addition to this a number of the farmers were using feed test results to further enhance the performance of the irrigated pastures.

The feed wedge was a priority



In general there seemed to be a high degree of managerial competency associated with the management of pastures. Despite most of the farmers being conscious of the need to produce cost effectively, only a couple of them could quote profit figures.

4.10 Cost of Production (COP) Workshop

A CoP workshop was conducted by Ken Solly and attended by the Tasmanian producers and most of the producers visited by them on the tour. The purpose of the workshop was to have a serious look at reducing the cost of production and increasing profit.

Ken presented a case study of a sheep production system and demonstrated the effect of changing various input costs on the bottom line of the enterprise. All attendees contributed to the various decisions made and agreed it was a very worthwhile exercise. It gave the Tasmanian producers a good insight into the South Australian production system and very much helped them to comprehend why the South Australian producers did the things they did.

Each of the attendees (both Tasmanian and South Australian) gave a brief presentation of their own properties, family, recent highlights and where each person saw themselves in 5-10 years time.

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Members of the study tour with Ken Solly (third from left) at the CoP workshop



Ken is an experienced presenter and ensured that the workshop flowed and all the participants contributed to its success.

4.11 Other issues and benefits of the trip

The tour members raised a number of other issues and ideas:

- One farm in particular had serious succession issues which had the potential to undo much of the hard work that had been done over a long period of time in getting the farm to where it is today.
- Drag chains on the front of the pivot will remove lambs from the pivot tracks and prevent them being run over. This is a serious problem for some of the producers in the group and this was a very cost effective solution.

Drag chains to prevent lambs being run over



- A number of the group members were impressed with the alliances between growers and processors. There is an intension to explore these opportunities by some of the tour group.
- The producers in South Australia had a greater propensity to use forward contracts between farmers and processors. These are almost non-existent in Tasmania but the Tasmanian producers could see significant benefits in these. The Tasmanian producers were surprised that many South Australian farmers would not use any other method of transaction

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- There were a number of alternative pasture species being used in South Australia. These may have some application in Tasmania, particularly from a water use efficiency point of view. The members of the tour group were very interested in the different managerial requirements of the varying species and again the importance of this to getting the most from the different species.

Prairie Grass pasture under irrigation



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- Dryland lucerne was of particular interest to some members of the group. It is a crop that may be of tremendous potential because of its drought tolerant qualities. Again the group realised the importance of correct management to capitalise on these benefits.

Dryland lucerne with chicory



- Multiple fertiliser applications are common place in South Australia under irrigated pasture systems. This is something that may not only benefit from a plant nutrition point of view but also from a cash-flow point of view.

At the time of writing this report none of the members of the study group had taken the opportunity to introduce new pasture species choosing rather to focus on trying to increase the productivity of the existing pastures first.

Another important benefit of the trip is that the members of the study group have undertaken a commitment to visit each other's farms this coming spring to further broaden their individual knowledge. The group bonded very well and are likely to stay in touch into the future.

5 Success in Achieving Objectives

While the achievement of the project objectives was constrained by a number of factors, the study tour did provide a significant opportunity to the group to learn about grazing systems under centre pivot irrigation. It was disappointing that seasonal conditions conspired to remove the opportunity to see as many animals under centre pivot irrigation as may otherwise have been the case.

The study group was motivated by the fact that farmers in South Australia face similar challenges to those in Tasmania, confirming the group should pursue the development of a project to look at the possibility of running both lambs and cattle in mobs that are much

bigger than might conventionally be the case. This would benefit a very wide audience and certainly not just those farmers in Tasmania.

The tour group gained good insight into the infrastructure required to run large mobs of cattle and lambs under irrigated systems. The group is confident that this is not a major limitation to running large mobs.

6 Impact on Meat and Livestock Industry

The purpose of this project was as a fact finding exercise to prevent the unnecessary investment into a larger project that because many of the problems that existed in Tasmanian had already be solved in South Australia, where the industry is much more mature having been exposed to centre pivot irrigation for a much longer period of time.

Many of the issues faced by Tasmanian producers remained unresolved by SA producers and as a result any further research and development is likely to have much wider application than just Tasmania.

7 Conclusions and Recommendations

The group came to the conclusion that the issue of running large mobs under centre pivots has not been successfully resolved and is still a major limitation to being able to capitalise on the production potential of irrigation.

With smaller mobs, profitable and sustainable production can be achieved and from the study tour it appears that more intensive grazing systems that could be deployed are the key to profit. If a very high degree of pasture management can be married with the low costs structure associated with large mobs, then it would appear that livestock finishing systems under centre pivot irrigation can be profitable and sustainable.

Much of the best management practices associated with grazing are known but are not widely practiced. This is the first and most limiting factor in profitable grazing systems using irrigation. It is imperative that any research or demonstration to look at large scale production and the issues associated with these is done under best management practice for grazing. In fact, being able to implement best management practice (from an economic, social and environmental perspective) with large mobs is the key to success.

It is recommended that MLA consider a larger project looking at the issue of running large mobs of lambs and cattle under centre pivot irrigation. Such a project would be timely and meet the needs of producers in a position to increase their productivity significantly and in addition would be an applicable project to the majority of southern livestock producers with the capacity to adopt large scale grazing systems using centre pivot irrigation.

In broad terms any project developed should address the following issues:

1. Large mobs of at least 1000 lambs and/or 200 cattle. The reason for this is that these large mobs decrease the need for both capital expenditure, associated with

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infrastructure and the cost of labour to shift a number of smaller mobs. Comparing this (the large mobs) with say two mobs of half the size and to calculate the difference in profitability of these systems by accounting for all the differences in costs and animal production and pasture performance.

2. Incorporation of intensive grazing management practices. That is, basing rotation lengths on plant morphology and measuring pasture growth and matching this to intake. The use of feed budgeting would be critical to this.
3. Making as much as possible of the required infrastructure movable. That is, in the case of things like yards, to be able to share between sites and in the case of fences and watering systems to incorporate a cropping phase.
4. Measurements of sustainability issues particularly with respect to pasture persistence and soil structure. Also looking at the issue of soil fertility, fertiliser use and nitrogen.
5. A design such that the principles and technologies that are developed are more broadly applicable than just in Tasmania (or where-ever the research may take place).

The members of the study tour were:

Name	District	Animals turned off pa under pivots
Tim Wallace	Blackwood Creek	6000 lambs
Bruce Archer	Westwood	2500 lambs 100 yearling cattle
James Brown	Bridport	6000 lambs 1000 yearling cattle
Sam Hood	Tomahawk	2000 lambs 400 yearling cattle
Peter Williams	DPIW – Launceston	

8 Appendices

Appendix 1: Program for the study tour

Waterhouse and Hagley Groups
 MLA PIRD 2007/T02
 Finishing Lambs and cattle on Irrigation
 Fact finding mission

Monday 3rd December

Time	Location	
9.15am	Mt Gambier Airport	Peter Williams - 0408 131 209
10am	Chardonnay Lodge, Coonawarra	8736-3309 Anne - 0417 816 075
11am	Leave Penola with lunch collected	
11.30am	Arrive at Damien Croser's "Mia Mia"	0428 846 300
1.30pm	Leave for "Ceres"	
2pm	Arrive at John & Peter Andre's	John - 0419 143 163 Peter - 0409 862 664
4pm	Leave for Mark Wheal's	
4.30pm	Arrive at Mark Wheal's	0421 667 230
6.30pm	Leave for return to Chardonnay Lodge	8736-3309 Anne - 0417 816 075
7.30pm	Dinner	

Time	Location	
8am	Leave for Morris Olivers – "Awendale"	0428 854 026
8.45am	Arrive – "Awendale"	
10.45am	Leave for Garry Possinghams "Biscuit Flat"... ..	0449 177 197
11.30am	Arrive ... "Biscuit Flat"....."	

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1.30pm	Leave for Charlie Lillecraps "Brackenlea"	0429 840 289
1.45pm	Arrive at "Brackenlea"	
4pm	Leave for Chardonnay Lodge	8736-3309 Anne - 0417 816 075
4.45pm	Arrive Chardonnay Lodge	
5.15pm	Lamb Finishing CoP Workshop & dinner with Ken Solly	Ken - 0427 620 895
Wednesday 5th Dec		
7am	Taswegians leave for Mt Gambier Airport	