FINAL REPORT

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

BWD18

The Economic Analysis and Communication of Best Practice in Wimmera and Mallee

PROJECT DETAILS

PROJECT CODE:	BWD18
PROJECT TITLE:	THE ECONOMIC ANALYSIS AND COMMUNICATION OF BEST PRACTICE IN WIMMERA AND MALLEE
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Summary

The project involved the development and extension of economic principles and outcomes, relevant to the farming systems of the Wimmera and Mallee of Victoria (VIC). The economic viability of Mallee and Wimmera growers and rural communities is highly dependent on how growers handle risk. The main risk factors are primarily agronomic, climate and price. Growers handle these risk factors through changing enterprise mix and scale, off-farm investments following good years, and the farming systems in place.

This project dealt with analysing the success of different farming systems in long term economic performance and outlined how different farming enterprises dealt with risk minimisation.

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Conclusions

Economic Results from Farming Systems Trial
Table 1. Yearly crop and sheep gross margins for each system ($/ha), (2000-04).

Fuel Burner 2000 2001 2002 2003 2004
Crop Income 272 334 36 309 72
Crop Variable Cost 147 111 133 175 93
Crop GM 125 223 49 134 -21
Agistment Income 9 9 12 1 5
Sheep GM 9 9 12 1 5
TOTAL GM 134 232 -85 135 -16

Hungry Sheep 2000 2001 2002 2003 2004
Crop Income 312 325 0 194 37
Crop Variable Cost 140 150 131 109 103
Crop GM 172 175 -131 85 -66
Sheep Trading Profit 110 22 -30 45 81
Sheep GM 110 22 -30 45 81
TOTAL GM 282 197 -161 130 15

Reduced Till 2000 2001 2002 2003 2004
Crop Income 274 323 0 392 66
Crop Variable Cost 125 149 146 149 126
Crop GM 149 174 -146 243 -60
Agistment Income 5 7 11 1 3
Sheep GM 5 7 11 1 3
TOTAL GM 154 181 -135 244 -57

Zero Till 2000 2001 2002 2003 2004
Crop Income 225 295 0 256 66
Crop Variable Cost 183 190 124 159 121
Crop GM 42 105 -124 97 -55
TOTAL GM 42 105 -124 97 -55

For the past five years, seasonal rainfall has been below average (<240mm). Due to the rainfall conditions, crops grown on fallow have performed better compared to crops grown on stubble. The most conservative system, Fuel Burners, where in

most years the crop intensity was 60% (with 40% fallow) has performed the best in terms of crop yield and income. The Hungry Sheep system, however, has performed better economically overall (despite some income fluctuation) due to the incorporation of livestock into the system. Livestock have been able to stabilise income and provide cash flow in cropping years heavily affected by drought conditions.

Crop choice has been identified as a key driver of economic performance rather than farming systems alone. The zero till system which was especially dependent on canola and pulses in the early years suffered economically compared to the more cereal based rotation systems. Rotational changes to include chemical fallow instead of pulses, as well as increased intensity of cereals, have seen the economic performance of the zero till system improve. A study comparing the economic performance of canola versus wheat in the southern Mallee demonstrated that wheat has been the less risky economic performer despite the higher commodity price of canola (see Attachment 1). Risk can also be reduced through the careful use of climate forecasting tools such as the Southern Oscillation Index (SOI) to help manage input costs throughout the growing season.

The project concluded that marketing grain forward before the planting of the crop is a very risky practice with a seven year historical analysis illustrating that in every case selling grain forward before sowing resulted in a lower price than could be achieved at harvest.

A gross income benchmark was developed for Wimmera and Mallee growers, which can be used to determine optimum scale.

The Birchip Cropping Group (BCG) economic multiplier is greater than 1.5.

Recommendations

Main recommendations leading from this work are:
1. Production risk (climate): Investigate seasonal climate forecasting (SCF) tools specific for each region. Not all published SCF tools are equally useful in all regions. SCF tools can assist growers in making crop choice decisions and input (dollars and type of input) decisions.

2. Production risk (agronomic): Needs to be evaluated with an economic outcome. It is not always the case that the highest yielding treatment is the most economic. Too much emphasis has been placed on yield and not on profit and risk. Agronomic practices across regions will differ not only in complexity and outcome, but also in economic viability. Farming practices should be assessed for cost and benefit. Trials undertaken by farming systems groups should be evaluated for economic return, not only gross margin return but also the implications on a whole farm budget.

3. Farming systems economic analysis: Are urgently required across all regions. Growers are spending large amounts on new farming systems and practices without those systems having been evaluated economically over time. Continuous cropping rotations need to be evaluated against more traditional fallow-crop rotations. This work is by its very nature long term because the effects of rainfall (and other impacts such as frosts and heat) on a farming system need to be investigated. The costs associated with new technology and systems are generally higher which puts more pressure on the continued performance of crops.The risk of drought or dry conditions needs to be assessed.

4. Livestock (primarily for meat): Fill a major role in crop production systems, not only for direct income but also as a weed management strategy. The role of livestock is rarely assessed in farming systems research even though in many regions growers still run livestock. Livestock income and costs are more difficult to assess compared to costs and income associated with cropping but it is an essential need for extension of the outcomes of farming systems research.

5. Investigation of new crops and varieties: New crops (large or niche markets) need continued investigation, especially in relation to economic performance and risk. Markets do change and new crops have succeeded (i.e. lentils in the 1990s and now Mallee canola (as mustard) in the dry regions in VIC). Little information is often available to growers when new crops are developed. The true cost and risk of these crops needs to be assessed.

6. Machinery costs and efficiencies: Machinery costs are approximately 25% of farm income. New technology costs also need to be incorporated into the farm budget. Machinery costs are a major input item and need to be carefully assessed in relation to contract vs. ownership; machinery size and cost vs. scale; machinery ownership vs. efficiencies (not only operation

efficiency but also labour efficiency).

Outcomes

The project has delivered economic data on a whole farm basis on how different farming systems are performing in the southern Mallee and how farming enterprises are handling risk in relation to climate and price.

Economic analysis of four different farming systems being practised commercially in the southern Mallee including zero till, reduced till, traditional cultivation, as well as a mixed cropping and livestock enterprises was carried out over the three year period. The project has delivered a more detailed understanding of cost structures associated with particular farming systems and provides a benchmark with which growers can assess the cost structure of their own business. Chemical, fertiliser, machinery and labour costs are key drivers of profitability and sustainability. This project demonstrated how each system performs in each of these areas.

The interaction between rotation, system, climate and economic performance has identified cereal based rotations during dry years have outperformed high pulseand canola rotations under all systems. An economic study comparing the value of wheat to canola for the southern Mallee was completed which showed canola should be used strategically within a cereal based rotation rather than being a dominant crop type. This conclusion was made despite high canola prices being received. The high input costs and yield uncertainty made canola a relatively high risk crop for the southern Mallee.

The project identified that the above risk can be managed using SCF tools such as the SOI, in conjunction with stored soil moisture to help plan rotations and in-season inputs to lower exposure to economic risk.

Given best practice management, a benchmark for the southern Mallee identified that for every 100mm (after the first 100mm) of annual rainfall, growers should be achieving $180 of gross income. In the Birchip area, with an annual average rainfall of 375mm, this means that in an average year, growers should be aiming for an income of $490/ha. Growers can assess the minimum scale and inputs to operate using this benchmark.

Marketing of grain also harbours some risk. Historical performance of forward selling cereals prior to planting the crop was compared to cash or pool returns achieved at harvest, which demonstrated to growers the merits of each system in relation to risk management. The study established that over the past 10 years, the wheat and barley pool returns have resulted in a greater gross return than by selling forward in March, May and even October. Selling physical product forward in March was assessed as high risk, given that seasonal outlook at that stage is unknown and crops have yet to be sown.

An economic impact assessment model was developed helping large farm groups such as the BCG, identify priority project areas and key areas of investment. The model will form part of the BCG's and other farm groups' continuous improvement policies.

Achievements/Benefits

The project has identified and developed a greater understanding of the key economic factors driving long term sustainability within the southern Mallee region. Economic components of different farming systems have been analysed in terms of their relationship with farm size, structure, crop rotation, interaction with climate and overall economic sustainability. Understanding the cost structure of each farming system which includes chemical, fertiliser, machinery and labour has helped identify the budgetary pressures that various farming systems will be under given changes in the market environment, e.g. oil prices and their impact on price of fuel and fertiliser.

The inclusion of livestock in the analysis has generated livestock figures and shown the vital economic contribution in dry areas that livestock make. Having livestock in the trials has also sparked discussion beyond economics including sustainability issues such as wind erosion and soil compaction. The project has identified that there is no clear methodology to determine the economic losses associated with such events. When the impact of factors such as erosion is hard to measure, developing an appropriate cost/benefit analysis is also made very difficult.

This project has highlighted and created greater awareness among the local farming community, as well as industry advisers and representatives, of the need to support every agronomic decision with financial considerations.

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In detail, the project outcomes were:
1. Economic analysis the of farming systems and on-farm practices
- Five consecutive dry seasons put pressure on the economic performance of the four farming systems in the farming systems trial. During this dry period, the systems which were most profitable were based on (i) cereal rotations, (ii) fallowing, and (iii) livestock. The continuous cropping rotation which incorporated pulses and canola in the rotation was not economically sustainable. During these dry periods, fallowing stores water for the following crop and those systems which used fallow performed better compared to the continuous cropping rotations. The argument that fallowing is a year lost from production does not hold because cash flow considerations are paramount. Livestock are clearly an integral component for the dry regions.They are a risk management tool which can be expensive during drought years (extra feed requirements) but are a bonus in years when crops are frosted or suffer from extreme heat and moisture stress in spring. The price for meat has been important in relation to good returns made by the systems which have sheep. The financial performance of each farming system was presented each year and is published in the BCG Production Manual.
- The economic performance of some of the trials undertaken by the BCG was determined with highlights being:
(i) Cost of herbicide resistance and alternative strategies such as oaten hay. Oaten hay can be a financial option in the southern Mallee. Not only is it a good herbicide resistance break but it is also a good financial option.
(ii) Cost/benefit of higher seeding rates in wheat. Crops sown at higher seeding rates (up to 200 plants/m^2) are more competitive (against weeds) but they are also economically viable.
(iii) Cost/benefit of using fungicides for the production of wheat and barley. Fungicides add another cost to what are already high input costs but their benefit has been demonstrated, especially if used at low rates and at more than one time.

2. Economic viability of farm structures in relation to scale, production strategies and risk
Many of the BCG trials are focused on improved agronomic performance with an emphasis on either reducing costs or improving production. Highlights of the work undertaken in this component of the project included:
- Machinery cost and efficiency. Machinery cost is a major component of the total farm cost structure (generally 25% of farm income is spent on machinery). The project investigated the machinery cost structures for different farming systems and in relation to ownership versus contracting. Efficiencies in getting the operation done were also investigated (scale).
- Production risk (as agronomic risk) was assessed at the farming systems trial as well as in numerous trials undertaken by the BCG. Rotations based on cereals were shown to be the most profitable and management strategies were investigated which were the most economic. Fallowing versus continuous cropping was investigated and it was shown that during this current dry period that fallowing had a place in conserving moisture for next year's crop. Canola was shown to be a high risk crop in the southern Mallee, especially during the past five years which have been drier than average with generally late starts to the season. Pulses can be profitable but only if the price is high (such as it has been for lentils). Field peas can be agronomically grown but because of their lower price are not a financially viable option.
- Production risk (as climate risk) was assessed in relation to SCF tools available. The main tools investigated were: (i) the April to growing season rainfall (GSR) indicator widely used in SA.Basically this tool states that if rainfall is above average in April that the chance for above growing season rainfall is also higher. This tool was tested throughout the Mallee and Wimmera using historical data and was shown to be of no benefit. There was no relationship in the Mallee and Wimmera in relation of April to GSR; (ii) SOI was shown to be a useful tool for in-crop decisions such as topdressing in late July or August. However, the SOI was not a good indicator for seasonal rainfall in May and June. The SOI predictive ability becomes stronger during the season and cannot be used for crop selection in April or May; (iii) farm income to rainfall benchmarks was investigated for farms in the Wimmera and Mallee. There was a strong relationship between rainfall and income (yield x price) for some farms and less strong on other farms. But an overall benchmark of production per mm of rainfall was developed for each region; (iv) price risk was investigated in relation to when growers should sell grain.The marketing strategy of forward selling was investigated compared to selling through the national pools or at harvest. In most years, it was not financially worthwhile to sell grain forward during the season (the production risk is also higher). The prices achieved at harvest or in the pools were generally higher.

3. Evaluation of the BCG activities on farms and regional communities.
In conjunction with the Royal Melbourne Institute of Technology (RMIT), an economic impact assessment of the BCG using Australian Bureau of Statistics (ABS) and Australian Bureau of Agricultural and Resource Economics (ABARE) data was undertaken. This resulted into undertaking an economic assessment which allowed a dollar figure to be generated defining the monetary impact of the BCG on the region and on farms within the region. This study also allowed forward projections to be made regarding the potential impact of various BCG activities. Such information helped with the prioritising of activities within the group. The models are presented as 'calculators' and are available from the BCG for other farm groups to use.

Other research

1. Further work be undertaken in relation to the economic impact models. Implementation with subsequent refinement and evaluation of economic impact model developed through BWD18. The impact of farm groups on local farms and on the economy of the region should be investigated.

2. Farming systems groups should investigate the production and price risk factors affecting growers in their region.

3. Costs and benefits of the direct outcomes of trials undertaken by farming systems groups should be part of each trial. Economic strategies should be developed to deliver in conjunction with agronomic management strategies developed from trial and project work undertaken by or in conjunction with BCG. The focus will be factors influencing income variability such as climate risk, price fluctuations, farm scale, structure and cost structures, plus cost and benefit of adoption of new technologies, practices and products. Access to output will be via current and future BCG communication mediums, as well as collaborator extension programs. Adoption will be high as the information is critical to farm decision making.

4. Economic evaluation of the integration of livestock production systems and cropping production systems in the southern and central Mallee and Wimmera regions.