EFFECTS OF INCREASING RESOURCE MANAGEMENT COSTS ON PRESSURE FOR STRUCTURAL ADJUSTMENT IN THE SHEPPARTON REGION

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The successful implementation of salinity management plans in the irrigation areas of Northern Victoria requires a large, on-going investment by both government and the rural community. Irrigated dairying, beef, sheep and cropping enterprise gross margins have been evaluated for a range of possible future commodity and input prices. Sheep enterprises are unlikely to be profitable at present or future expected wool prices. Beef enterprises can be profitable if the scale of operation is big enough. Dairying provides an efficient use of irrigated pasture and will be profitable provided the level of debt per cow is minimised for a given interest rate. Irrigated cropping provides a range of relatively profitable alternative enterprises for mixed farmers if full use of the flexibility that irrigation offers is harnessed. Proposed increases in water and drainage charges under the RWC Business Plan will reduce the profitability of all irrigated enterprises and hence the ability of farmers to invest.

Introduction

The Shepparton Irrigation Region Land and Water Salinity Management Plan is currently being implemented over an area of 500,000 hectares in Northern Victoria. The successful implementation of all components of the Plan is dependent on the farming community's ability to pay for their share of the necessary works, both on and off-farm. In 1989/90, landholders invested $24 million in works, aimed at improving water and labour use efficiency and reducing accessions to the watertable. The farm works included improved irrigation layout, improved supply and drainage systems and the installation of tailwater re-use systems. A large proportion of the works were based on detailed Whole Farm Plans. Off-farm works saw the start of investment in new Community Surface Drainage Schemes with the State paying approximately half of the cost of capital works.

The underlying assumptions are that farmers can afford to pay for the works now, and having done so, will continue to be both profitable and viable in the long term.

In a large proportion of the Shepparton Region, production loss, as a direct consequence of soil salinity, has not manifested itself. However, the physical conditions of rising watertables and more regular waterlogging indicate that the salinisation process is occurring over large areas. Without any intervention, the future productivity losses in the Region are, predictably, very high, with resulting reduced profitability, land degradation, social disruption and enormous pressure for accelerated farm structural adjustment.

This paper investigates the profitability of individual farm enterprises (grazing and cropping) found in the Shepparton Region and attempts to identify the sensitivity of

the enterprises to changes in commodity prices and input prices.

The aim is to draw the Government's, the Salinity Program Advisory Council's (SPAC's) and landholders' attention to the relative profitability of farm enterprises and the likely scale of operations that will allow profitable farming to continue in the Shepparton Region.

METHODOLOGY

Detailed Gross Margin models, for both irrigated and dryland farm enterprises, have been developed using Lotus 1-2-3 (v.2.2) on IBM compatible computers. The models make use of both macro's and linked files to automate the evaluations.

GROSS MARGIN = GROSS ENTERPRISE INCOME
Minus
ENTERPRISE VARIABLE COSTS

Each of the 35 enterprises evaluated, both dryland and irrigated, can be sensitivity tested for Gross Income by varying both Commodity Price and Yield.

Enterprise variable costs can be sensitivity tested for real changes in each component cost to evaluate the impact on overall enterprise Gross Margin.

The following enterprises have been evaluated:

- Dairying
- Beef (irrigated and rainfed)
  - Breeding vealers
  - Breeding weaners
  - Fattening yearlings and bullocks.
- Sheep (irrigated and rainfed)
  - Merino self-replacement flock for wool production.
  - Merino wethers for wool production
  - Breeding fat lambs from 1st Cross ewes
- Winter Crops
  - Wheat (irrig. and rainfed)
  - Barley " "
  - Oats rainfed only
  - Canola (irrig. and rainfed)
  - Faba Beans (irrig. and rainfed)
  - Field Peas (rainfed)
  - Lupins (rainfed)
  - Safflower (rainfed)
  - Chick Peas
- Summer Crops - all irrigated
  - Sunflowers
  - Soybeans
  - Grain Sorghum
  - Maize (grain)
  - Maize (silage)
  - Millet
  - Lucerne for hay

The average yields and input levels assume a reasonable standard of management by the farm operator. This paper will report on the irrigated

enterprises.

The Gross Margin model prepared for Dairying can also evaluate the impact on profitability of debt level per cow at a range of future proposed water and drainage charges for given loan interest rates. This model includes fixed or overhead costs. It makes use of macro's to automate the model.

A change in Total Gross Margin on a farm is a good measure of the impact on productivity due to salinity and waterlogging mitigation works. It measures the response of the various enterprises to improved plant growing conditions and often associated improved management. It also can be used to measure the impact of changes in the terms of trade of agriculture on enterprise viability and farm profitability. The impact on farm profitability must take into consideration the ability of the Total Gross Margin generated, from all enterprises on the farm, to offset the overheads, capital and finance charges, living allowance and depreciation if the farm is to be viable in the long term.

If it is assumed that all of the last mentioned fixed overheads remain constant in the relative short term, say, the next five years, then changes in the gross margins of individual farm enterprises and therefore, Total Farm Gross Margin, will directly impact on farm profit and the ability of landholders to invest in salinity mitigation works.

DAIRYING

Since 1971, the Terms of Trade in the Dairy industry has been declining by an average of 4.3% per annum. In the year to May, 1991, the decline has been approximately 6%. This means that the divergence between the decline in the real price of dairy products and the rise in the real cost of production has been increasing by 4.3% and 6% respectively. i.e. costs have been increasingly outstripping prices, in real terms, of dairy produce for the last 20 years (ABARE, May 1991).

The RWC Business Plan, 1990/91 - 1994/95, has identified a policy aimed at achieving financial self-sufficiency over the next fifteen years. Amongst other initiatives, it proposes to gradually increase the price of irrigation water to achieve a zero rate of return within fifteen years. In the Shepparton Region this will require a real annual increase of approximately 4%.

Drainage charges must be added to the following charges. These will vary, depending on the level of service and whether on not surface and sub-surface drainage is provided. Current estimates for future surface drainage rates (1992$) range from $2 to $12 per ML with a weighted value of around $6/ML. Sub-surface drainage rates will range from $0 to $8/ML, averaging around $5/ML. These charges represent the major contribution of landholders to off-farm salinity mitigation works.

$ per ML		Irrigation Water Real Relative price		Nominal Price (i.e. Plus inflation)	
i.e.	Now	1.00	$14.76	(5%)	(3.5%)
	1993	1.04	$15.35	$16.09	$15.86
	1994	1.08			
	1995	1.12			
	1996	1.17			
Year 5	1997	1.22	$17.96	$22.71	$21.19
	1998	1.27			
	1999	1.32			
	2000	1.37			
	2001	1.42			
Year 10	2002	1.48	$21.85	$34.94	$42.95
	2003	1.54			
	2004	1.60			
	2005	1.66			
	2006	1.73			
Year 15	2007	1.80	$26.57	$53.76	$43.67

The single greatest component of total variable costs on a Dairy farm is feed supply (60-70% of variable costs). This includes seed, fertiliser, concentrates, hay, irrigation water and any pumping costs. Depending on the amount of concentrates fed, irrigation water represents from 15-22% of variable costs. Pasture as a feed source is substantially cheaper to produce per kilogram of butterfat produced but the need to maximise production per cow up to her genetic potential can make concentrate feeding attractive if a cheap source of grain is available.

Given the contribution to variable costs of water charges, the proposed increases in water prices will have the following effects on total variable costs:

			Tot.Var.Cost Increase
Year 5	15-22% of 1.22	=	18 to 27% Real
Year 10	15-22% of 1.48	=	22 to 33% Real
Year 15	15-22% of 1.80	=	27 to 40% Real

This assumes the cost of all other inputs remain constant in real terms.

The proposed real increase in variable costs, due to water alone, will occur in the context of a historically real decline in farm-gate dairy prices of approximately 2.2% over the last 20 years (ABARE). Historically, the price decline has been balanced largely by improved technology and management (improved irrigation layout, longer grazing rotations, strategic concentrate feeding, superior genetics etc). On many smaller intensively operated dairy farms, any additional productivity gains will be relatively small and will invariably require new investment with its associated overheads. The most likely productivity increases for the smaller dairies will be through an increase in concentrate feeding to allow the full genetic potential of the cows to be expressed. Such a move towards a feed lot type of system may not require a large cash investment but will require specialised skills in

nutrition and waste management. The first step towards this system is currently being taken in this Region by farmers who are purchasing standing maize crops for silage or green chop. The attractiveness of this system faltered in 1991 because of the low price of grain and the reluctance of the maize growers to meet the market when the crop was at the ideal harvest stage.

Dairying and any other enterprise that uses a high proportion of permanent or summer pasture will be very susceptible to large real changes in water and drainage charges tied to water use in this environment, as irrigation water over the summer period is vital to maintain productivity. In summer, rainfall supplies a varying, but minor component of total plant water requirements. The combination of warm weather plus irrigation on responsive pastures allows the production of relatively cheap feed, per tonne of dry matter. Therefore the Dairy Industry in northern Victoria is tied to a system with a high proportion of irrigated summer pasture. Where low winter temperatures restrict pasture growth and surface waterlogging is a problem, there are very practical reasons why winter milking is less common in the Shepparton Region.

The long term viability of individual dairy farm operations is based on the ability to generate sufficient Total Gross Margin to cover all overhead costs, maintain or replace necessary fixed assets and provide a reasonable living standard for the operator.

Dairy Debt Levels

The most damaging overhead cost which will place the business at risk is unplanned debt and the associated interest charges. Payment of interest on interest is non-productive expenditure which consumes funds which could be otherwise invested in improved standard of living, replacement of assets and salinity mitigation. Debt management is therefore one of the most critical aspects of overall farm business management. As part of the analysis undertaken in preparation of this paper, the impact of varying levels of DEBT PER COW for a 40 ha, 110 cow dairy herd was evaluated. The farm had 30 ha of permanent pasture and used 200% of water right (total of 340 ML).

The following two tables sensitivity test, for loan interest rates of 18% and 11%, the impact of the debt per cow and water plus drainage charges on the surplus funds generated by a 110 cow herd to pay an operator's allowance, income tax, personal insurances, replacement of major assets and investment in on-farm salinity and waterlogging mitigation.

Water charges of $25, $30 and $35 per ML approximate real water plus drainage charges in years five, ten and fifteen, respectively. The model assumes that real Gross Income levels are constant, whether through improved technology and /or better management. The drainage charge of $5 per ML is held constant in real terms and represents some combination of surface and sub-surface drainage works, i.e. the farmer's share of off-farm salinity mitigation.

Table 1. Dairy Debt Levels per Cow vs Future Water Prices at 18% Loan Interest Rate.

primary farm loan interest		=	18.00%	Machinery Int.		20.00%	$15,000
Water plus drainage cost	15.00	20.00	25.00	30.00	35.00		
$ per ML	Now		5 yrs	10 yrs	15 yrs	Total	Primary
	Personal surplus for living,tax etc ($)					Debt	Loan
debt/cow $						$	$
0	41625	39925	38225	36525	34825	0	0
200	35234	33534	31834	30134	28434	22000	7000
400	30914	29214	27514	25814	24114	44000	29000
600	26593	24893	23193	21493	19793	66000	51000
800	22272	20572	18872	17172	15472	88000	73000
1000	17951	16251	14551	12851	11151	110000	95000
1200	13630	11930	10230	8530	6830	132000	117000
1400	9309	7609	5909	4209	2509	154000	139000
1600	4988	3288	1588	-1112	-1812	176000	161000
1800	668	-1032	-2732	-4432	-6132	198000	183000
2000	-3653	-5353	-7053	-8753	-10453	220000	205000

Table 2. Dairy Debt Levels per Cow vs Future Water Prices at 11% Loan Interest Rate.

primary farm loan interest			11.00%	Machinery Int.		13.00%	15,000
Water plus drainage cost	15.00	20.00	25.00	30.00	35.00		
$ per ML	Now		5 yrs	10 yrs	15 yrs	Total	Primary
	Personal surplus for living,tax etc					Debt	Loan
debt/cow						$	$
0	41625	39925	38225	36525	34825	0	0
200	36387	34687	32987	31287	29587	22000	7000
400	33327	31627	29927	28227	26527	44000	29000
600	30268	28568	26868	25168	23468	66000	51000
800	27209	25509	23809	22109	20409	88000	73000
1000	24149	22449	20749	19049	17349	110000	95000
1200	21090	19390	17690	15990	14290	132000	117000
1400	18030	16330	14630	12930	11230	154000	139000
1600	14971	13271	11571	9871	8171	176000	161000
1800	11911	10211	8511	6811	5111	198000	183000
2000	8852	7152	5452	3752	2052	220000	205000
N.B. The assumption is that a living allowance of $20,000 is the							
minimum needed for a reasonable standard of living.							
Depreciation is not included but some minor asset replacement							
is included.							

The following observations can be made from each table and by comparing the two tables:

i) at present water prices, the maximum debt per cow which allows a living allowance of at least $20,000 is approximately $800 and $1,200 per cow at 18% and 11% respectively. Debts per cow greater than these will cause the added interest burden to erode the desired living allowance.

ii) at present water prices and 18% interest, debt greater than $1,800 per cow will erode all the cash surplus, leading to severe financial hardship.

iii) at present water prices and 11% interest, a cash deficit only occurs at debt per cow greater than $2,000.

iv) at present water prices and 18% interest, the debt per cow which allows a living allowance of at least $20,000 is the same as year 15 water prices and 11% interest. i.e. an equivalent real operator's allowance can be maintained under the proposed RWC water price increases in 15 years if the interest rate falls to 11%. The allowance of $20,000 does not permit asset replacement.

The following table shows the impact of a 2% per annum real decline in Gross Income in year 15, in spite of productivity gains, with a loan interest rate of 18%.

Table 3. Impact of a 2% per annum real decline in Gross Income

primary farm loan interest =			18.00%	Machinery debt =		20.00%	15,000
Water plus drainage	15.00	20.00	25.00	30.00	35.00		
$ per ML	Now		Year 5	Year 10	Year 15	Total	Primary
debt/cow	Personal surplus for living,tax etc					Debt	Loan
0	41625	39925	28985	18932	9682	0	0
200	35234	33534	22594	12541	3291	22000	7000
400	30914	29214	18273	8220	-1029	44000	29000
600	26593	24893	13952	3899	-5350	66000	51000
800	22272	20572	9631	-421	-9671	88000	73000
1000	17951	16251	5311	-4742	-13992	110000	95000
1200	13630	11930	990	-9063	-18313	132000	117000
1400	9309	7609	-3331	-13384	-22634	154000	139000
1600	4988	3288	-7652	-17705	-26955	176000	161000
1800	668	-1032	-11973	-22026	-31275	198000	183000
2000	-3653	-5353	-16294	-26347	-35596	220000	205000

To maintain the living allowance at greater than $20,000 per annum (real 1992$), the debt per cow will be as follows:

Now (1992) - Between $800 and $1,000 per cow

Year 5 - Between $200 and $400 per cow

Year 10 - $0 debt only gives a living allowance of $18,932.

Year 15 - $0 debt only gives a living allowance of $9,682 (1992 $).

The entire cash surplus will be consumed at a debt per cow of:

	Year 5	-	about $1,200 per cow
	Year 10	-	about $600 per cow
and	Year 15	-	about $350 per cow.

These estimates clearly indicate the difficulties faced by a 110 cow dairy operation under the conditions of declining Terms of Trade associated with debt servicing commitments.

DAIRY INDUSTRY STRATEGY

It is recognised that there is a large investment in an effective irrigated hectare. This includes the irrigation layout, supply and drainage systems, laneways, reuse systems, fences, pasture and soil structure. In addition, there is the capital invested in the irrigation water used on the effective hectare.

The individual dairy farmer's financial priority, which aims at long term viability in the industry, should be to maximise production per effective irrigated hectare on the maximum number of hectares, without unnecessarily increasing total overheads.

To achieve this aim, an integrated package of livestock, feed, water and financial management is required. A minimum disease dairy herd which is capable of efficiently utilising well managed irrigated pasture is the basis for future viability. High average production per cow is not a short term aim if it is achieved through a high cost concentrate feeding program whilst pasture drymatter per effective hectare is under utilised. An on-going production oriented breeding and culling program can upgrade a herd and build up numbers in a cost effective manner. It is, however, pointless purchasing very expensive, high producing cows, if feed management, waterlogging or salinity are limiting overall farm productivity.

Similarly, the decision to increase the scale of operation must involve a careful evaluation of the alternatives (lease versus buy) for increasing the number of effective irrigated hectares. A first step may be to improve currently owned land and to agist all non-milkers. Transferable Water Entitlements provide the option of security of water supply for layout of new permanent pasture on the existing farm. This may be preferable to investment in additional land where some inefficiencies in logistics may result.

Provided the impact of debt per cow is evaluated for every investment decision, whether new land, laser grading, additional stock or even a new vehicle, and the productivity related technical assumptions are correct, then such investments, which aim to increase total gross margin, have the potential to increase overall net farm returns.

Where the debt per cow is already too high and further investment will increase the debt per cow and involve uncertain assumptions, the best financial decision a dairy farmer might make could be to sell out with some equity intact.

OTHER GRAZING INDUSTRIES - BEEF, WOOL AND PRIME LAMBS

Beef, wool and prime lambs are usually part of a mixed farming operation which also includes some cropping. There are, however, some specialists in each activity in the Shepparton Region. These enterprises are run on varying combinations of irrigated permanent pasture, irrigated annual pasture and dryland (rainfed) annual pasture throughout the Region.

BEEF CATTLE BREEDING AND FATTENING

Beef are often run on ex dairy farms which have a high proportion of permanent pasture and good water rights. The intensity of pasture management is usually low, compared to dairying, and the pasture drymatter utilisation is poor, compared to dairying but the fertiliser and irrigation inputs can be substantially less. They require a relatively low labour input, compared to dairying, which allows the operator to seek off-farm employment or contracting.

A typical farm may comprise 40 ha and run 100 breeding cows (purebred and dairy cross) and may also carry some replacement heifers if the property is well managed. Usually, on a property of this size, to carry replacements, breeding numbers would have to be reduced proportionately. Many operators buy their replacements as cows on the point of calving.

The beef enterprises evaluated in this paper include:

- Breeding vealers
- Breeding store weaners
- Fattening yearling steers
- Fattening bullocks over two years.

The following summaries show gross margins estimated for situations of 70% perennial pasture and 30% irrigated annual pasture. The permanent pasture is receiving 9ML irrigation water per hectare and the annual pasture is receiving 3ML per ha.

Given the assumed pasture type of 70% perennial and 30% annual irrigated pasture, a current water plus drainage charge of $16 per ML and a beef dressed price of 224 cents per kg, the following herd characteristics can be estimated. The average water use per ha is the same because of the pasture mix. Estimations of Total Gross Margins for larger or smaller herds can be made by applying the multiple directly to the current gross margin. The GM per ha, ML, DSE and $100 Capital invested should remain relatively constant.

Table 4. Land and Water Use and Gross Margin per Beef Enterprise.

	Vealer	Weaner	Yearling	Bullocks
No.units	100 cows	100 cows	193 steers	100 bullocks
Total DSE carried	1540	1540	1540	1592
DSE/ha	23.1	23.1	23.1	23.1
Total ha needed	67	67	67	67
ML/ha	7.2	7.2	7.2	7.2
Total ML	480	480	480	496
GM $/ha	149	89	81	142
GM $/ML	20.64	12.33	11.23	19.71
GM $/DSE	6.44	3.84	3.50	6.15
GM $/$100 Capital	20.00	12.00	8.00	11.00
Total $ GM	$ 9913	$ 5919	$ 5408	$ 9784
% Variable Costs				
Health	6.81%	6.89%	4.24%	4.05%
Supp. feed	16.5	16.68	9.42	20.39
Super.	26.94	27.24	25.29	24.18
Water	40.05	40.49	37.59	35.94
Freight	1.72	1.74	3.73	1.77
Selling costs	7.97	6.96	19.74	13.66

An estimation of the size of a viable beef production unit can be made by calculating the factor needed to multiply the total enterprise gross margin such that the result is sufficient to cover all farm overhead expenses including depreciation and an operator's allowance. For example:

Cash overheads	$25,000
Interest	15,000
Depreciation (asset replacement)	10,000
Operator's Allowance	20,000
	$70,000

	GM/Production Unit	Multiplier
Vealers	$9913	7.06 or 706 Breeders
Weaners	$5919	11.84 or 1184 Breeders
Yearlings	$5408	12.94 or 2498 Yearling Steers
Bullocks	$9784	7.15 or 715 Bullocks.

The scale of operations to break even as a specialist beef producer, given the above assumptions, requires a minimum of 470 ha for vealer production up to 866 ha for fattening yearling steers.

If the pasture type was 90% irrigated annual pasture and 10% dry pasture, the equivalent breakeven point for vealers would require 520 cows on a total of 660 ha.

Similarly, for yearlings, 1505 steers would have to be fattened on 995 ha. An important variable in the yearling fattening enterprise is the assumed weight gains. The weight gain selected is conservative and may underestimate gross income. The following table sensitivity tests gross margin against a 10% and 15% increase and decrease in gross income (70% PERM PAST. and 30% ANN. PAST.).

Table 5. Sensitivity Testing Beef Gross Margins against 10% and 15% Increase and Decrease in Gross Income.

VEALERS	-15%	-10%	CURRENT	+10%	+15%
GM $/ha	$83	$105	$149	$192	$214
GM $/ML	$12	$15	$21	$27	$30
WEANERS					
GM $/ha	$33	$51	$89	$126	$145
GM $/ML	$5	$7	$12	$18	$20
YEARLINGS					
GM $/ha	$23	$42	$81	$120	$139
GM $/ML	$3	$6	$11	$17	$19
BULLOCKS					
GM $/ha	$73	$96	$142	$188	$211
GM $/ML	$10	$13	$20	$26	$29

The previous table, which lists each variable cost as a percentage of total variable costs for each beef enterprise, enables an evaluation of the sensitivity of real changes in the cost items. e.g. Vealers

Animal Health	6.81%
Supplementary feed	16.50%
Superphosphate	26.94%
Irrigation water	40.05%
Freight	1.72%
Stock selling expenses	7.97%

Changes in irrigation water, fertiliser and supplementary feed costs have the greatest impact on total variable costs and hence the gross margin of beef enterprises in descending order.

Supplementary feed costs are closely related to grain and hay prices and will fluctuate seasonally. The real cost of unprocessed supplementary feeds has fallen in line with other agricultural commodities and is unlikely, in the foreseeable term, to impact on total variable costs. Various feed grains, hay and silage can be substituted in a feed mix to minimise the fluctuations of supplementary feed costs. Processed feed prices include a manufacturing component. Rises in manufacturing costs can be offset to some extent by real falls in commodity prices. A 10% real rise in supplementary feed costs (unlikely) would only cause a 1.65% real rise in total variable costs.

Fertiliser costs have remained relatively constant in real terms in recent years since the removal of the fertiliser bounties. However, a 10% real increase in fertiliser prices would result in a 2.7% real increase in variable costs.

At present costs, the major component of total variable costs is irrigation water, averaging 38.5% across all beef enterprises. The proportion declines to 37.3% when the pasture comprises of 90% irrigated annual and 10% dry.

The impact on variable costs of proposed water price increases under the RWC Business Plan plus drainage charges for salinity control are as follows:

	Real $	% Increase vs NOW	% Variable Cost Real Increase vs NOW	Gross Margin per hectare Vealers
NOW	$16			$149
Yr 5	$25	56%	21.5%	$84
Yr 10	$30	87.5%	33.7%	$48
Yr 15	$35	118.75%	45.7%	$12

At $30 per ML, the total gross margin for weaners and yearling steers is negative. All gross margins are negative or minimal at $35 per ML (1991 $).

THE FUTURE FOR BEEF CATTLE IN THE SHEPPARTON IRRIGATION REGION

Beef cattle are not the most profitable irrigated grazing enterprises in the Region. It would be unlikely to find many properties of a scale necessary to be viable as sole beef operations in the long term. The role of beef cattle is as a complementary enterprise on a dairy farm, to utilise pasture areas not suitable for high quality dairy pastures. e.g. due to occasional waterlogging. Beef will also play an important role on mixed farms with cropping and sheep as commodity prices fluctuate. A large number of beef cattle are, and will continue to be, run on small hobby farms and ex-dairy farms which are characterised by a high proportion of off-farm income.

Without the off-farm income, many of the small beef operators will be faced with serious hardship and their ability to undertake salinity mitigation works will be minimal.

WOOL AND PRIME LAMBS

Sheep are run on less intensively irrigated sub. clover pastures on larger mixed farms in the Shepparton Region. The recently abolished Reserve Price Scheme operated by the Australian Wool Corporation encouraged the build-up of the Australian flock with little regard for total world-wide demand. The inability to clear the growing wool stockpile led to the removal of the Reserve Price Support Scheme with consequent dramatic falls in both wool and sheep livestock values. Meat sheep values fell in sympathy with wool sheep values. One benefit has been that the cost of stock replacement has fallen.

The sheep enterprises evaluated in this paper are:

Merino self replacement flock - for wool production
Merino wethers - for wool production
First Cross ewes producing prime lambs - for meat

In each sheep enterprise, income is derived from wool and sale of livestock, either as breeders, young merino wether wool cutters, mutton or lamb. With the rapid fall in both wool and wool sheep values, the impact on woolgrowers has been severe. The following table shows a real wool price fall of 25% in 1990/91, compared to the real average of the last 21 years and an equivalent 79% fall in real average stock saleyard prices.

The impact on prime lamb producers has not been as severe on saleyard prices, with a fall of only 32% , but with a growing dependency on wool income under the reserve price scheme, an equivalent 59% fall in net wool prices, compared to the real average of the last 21 years, has shocked the industry and threatened the long term viability of the prime lamb industry.

To place prices in historical context, this data was extracted from the Department of Agriculture's South West Victorian Monitor Farms Project - Summary of Results - 1990/91, as prepared by Andrew Patterson (Hamilton):

(all in 1990/91 $)	Wool Sheep	Prime Lambs
Wool Price 21 yr average	$5.77/kg	$4.35/kg
Wool Price 1990/91	$4.30/kg	$1.79/kg
Diff b/w 1990/91 & 21yr avg.	-$1.47/kg	-$2.56/kg
% difference	-25%	-59%
MEAT		
Meat Price 21 yr average	$23.63/hd	$30.42/hd
Meat Price 1990/91	$ 5.04/hd	$20.67/hd
Diff b/w 1990/91 & 21yr avg.	-$18.59/hd	-$9.75/hd
% difference	-79%	-32%

Table 6. below, summarises the Gross Margins of the irrigated sheep enterprises evaluated for this paper.

The Gross Margin per ha is negative for wethers, +$3.01 for merino ewes and only +$13.87 for prime lambs, based on irrigated annual pasture.

Water comprises, on average, 27% of variable costs and the proposed increases in water and drainage (for salinity control) charges will effectively eliminate sheep enterprises from the irrigation areas.

Running a small mob of sheep at a loss may be acceptable to a mixed farmer if they can be effectively used in a crop weed and disease control program and reduce the dependency on chemicals. They are, however, more suited to the extensive dryland conditions of the pastoral zone and traditional wheat-sheep zone.

The role of irrigation in sheep production will revert to its dryland role where comparatively small areas of special purpose fodder are grown to finish high value stock for market such as prime lambs, wean lambs on to during periods of severe grass seed infestation risk in late Spring or to produce a guaranteed hay reserve.

The higher rainfall tableland and slopes areas and dryland adjacent to irrigation areas can provide a lower cost environment for wool production where there can be large economies of scale.

Table 6. Land and Water Use and Gross Margin per Sheep Enterprise.

	Merino Self Replacement Flock	Merino Wethers	Prime Lambs
No.units	390 Ewes	1000 Wethers	485 1sts Cross Ewes
Total DSE carried	1000	1000	1000
DSE/ha	12.0	12.0	12.0
Total ha needed	83	83	83
ML/ha	3	3	3
Total ML	250	250	250
GM $/ha	$3.01	-$1.52	$13.87
GM $/ML	$1.00	-$0.51	$4.62
GM $/DSE	$0.25	-$0.13	$1.16
GM $/$100 Capital	2.04	-$1.05	$11.76
Total $ GM	$ 250	-$ 126	$ 1154
% Variable Costs			
Shearing	21%	19%	12%
Mulesing	1%	-	-
Animal Health	6%	9%	7%
Supp. feed	11%	0	8%
Superphosphate	12%	11%	15%
Irrig'n Water	25%	24%	31%
Freight	4%	6%	12%
Wool Selling Costs	20%	31%	11%
Stock Selling Costs	1%	0	5%

CONCLUSION - THE SHEEP MEATS AND WOOL INDUSTRY IS IN A SERIOUS FINANCIAL POSITION IN IRRIGATION AREAS!

IRRIGATED CROPPING IN THE SHEPPARTON REGION

Many crops, both summer and winter, can be grown in the Shepparton Region. These include the winter cereals, wheat, barley, oats, cereal rye and triticale; the legume, Faba Beans; and the oilseed crop, Canola. The other winter crops, including field peas, lupins, chick peas and safflower are better grown under rainfed conditions in well drained locations.

The irrigated summer crops include sunflowers, soybeans, grain sorghum, millet, maize for grain and silage, lucerne hay and tomatoes. The growing of sunflowers is being limited at present due to disease problems.

Tomatoes have become a very specialised crop, requiring intensive and skilled management to achieve consistently high yields. Tomatoes are not usually grown in the same paddock for more than two consecutive years if disease problems are to be avoided. A high proportion are grown under trickle irrigation and can potentially achieve high yields.

The one thing in common with all crops in the Shepparton Region is that they must be grown in an appropriate rotation. Apart from crop disease considerations, the fragile nature of most of the red brown earth cropping soils in the region means that they must be managed carefully. Irrigating these soils under continuous cropping regimes increases the risk of damage to soil structure through increased susceptibility to slaking and dispersion of the clays (sodicity). This results in increased rootzone waterlogging due to the reduced ability of the soil profiles to drain between irrigation and rainfall events. Direct drilling and the maintenance of soil organic matter and the application of gypsum helps minimise this problem.

This discussion on cropping highlights the likelihood that a cropping program will involve a range of compatible crops and some period under pasture with either sheep or cattle.

The need to irrigate winter crops will depend on seasonal rainfall distribution, particularly in the autumn and spring, with typical irrigation water use ranging from 4ML/ha to 1.5ML/ha. Water charges represent approximately 8% to 10% of variable costs and are an insurance against late autumn breaks and dry periods in late winter, early spring. Harvesting and grain handling can be over 50% of total variable costs. These crops are not as susceptible to changes in irrigation water charges as summer crops, which may require up to 9 ML/ha over the season. Water can represent up to 30% of total variable costs in summer crops and fertiliser costs can be an additional 20% to 30%. Where crops require cartage to Melbourne or Portland, harvest, handling and cartage costs can be a further 20% to 30%.

Both summer and winter irrigated broadleaf crops generally require a more complex pest and disease management program which increases the risk of growing the crops compared to cereals but their returns per hectare can be high.

Crop Income - A Function of Price and Yield

Grain Prices

Grain prices do and will continue to fluctuate from year to year, depending on the world's supply and demand situation. ABARE attempts to forecast future price trends based on their knowledge of these conditions. It can be very difficult, however, to predict prices during a politically motivated international price war.

Crop Yields

Farmers have some control over the expected yield of irrigated crops. Irrigation removes the drought risk but can introduce additional risks such as increased waterlogging, salinity and sodicity.

Provided a farmer selects the optimum rotation for the soil and climatic conditions, uses technology that maintains soil fertility and soil structure and controls undesirable pests, weeds and diseases, then it is possible to develop profitable cropping rotations which produce better than average yields.

The range of crops available in the Shepparton Region gives a high degree of flexibility in the rotations. Recent farm surveys in the Shepparton Region associated with the SPAC Surface Drainage Program (Mucketah. Rendell, 1991) indicate that mixed farmers in Northern Victoria respond very quickly to changes in commodity prices. In 1990/91, there was a marked reduction in sheep numbers and wheat area planted, with proportional increases in alternative cereals, oilseed and grain legume crops.

CROP PROFITABILITY IN THE SHEPPARTON REGION

Detailed crop gross margins have been calculated for all of the commonly irrigated broadacre crops.

The models allow sensitivity analyses for Income and Cost variations for each of the below crops. Income is tested for a range of prices and yields and costs are tested for a 2%, 5%, 10% and 15% increase in costs against the above price and yield variations. The Gross Margins are based on a farmer's direct operating costs and not contract rates (cf. Northern Cropper magazine which uses contract rates).

The following table is a summary of the Gross Margins for summer and winter broadacre irrigated crops potentially available to Shepparton Region farmers.

Both Gross Margin per hectare and Gross Margin per megalitre are shown as mixed farms tend to have smaller water rights per hectare and water is the most likely limiting resource.

Table 7. Crop Gross Margins at 1991 Water and Drainage Charges

CROP	YIELD (TONNES)	PRICE ($/t)	G.M. ($/HA)	G.M. ($/ML)
Winter Crops				
Wheat	4	120	-$12.90	-$4.30
Barley	4	141	202.93	$101.47
Canola	1.5	300	$183.38	$122.25
Faba Beans	2.5	230	$253.22	$168.81
Summer Crops				
Sunflowers	2.25	300	$268.25	$35.77
Soybeans	2.2	350	$355.00	$41.76
Maize (grain)	8	170	$661.59	$77.83
Maize (sil.)	18	70	$782.78 ##	$97.85 ##
Sorghum	5.5	130	$228.26	$30.43
Millet	2	300	$216.36	$27.05
Lucerne Hay **	18	112(avg.)	$779.73	$86.64

Maize silage - this does not include harvest costs as crop is sold in the paddock, ready for chopping.

** Lucerne hay production - it should be recognised that the marketing of lucerne hay is as important as its production if consistently good prices are to be obtained.

Maize for silage is an example of a crop which can provide benefit to the grower and to the dairy industry, if its marketing is well managed.

At a drymatter yield of 18 tonnes per hectare and a price of $70 per tonne it can return a gross margin of $782 per hectare to the grower. The buyer, a dairy farmer, is purchasing a feed supplement in the form of a standing crop which has to be harvested and transported to the farm. The all up cost could be as much as $120 per tonne of drymatter. The value of this has to be compared against an equivalent number of feed units in the form of hay or grain which can be easier to handle. Silage has high wastage potential if it is handled poorly. When grain prices are low, the maize silage grower has a wide price range to bargain with and still remain profitable. e.g. at $50 per tonne the gross margin is still $423/ha. If it is a question of being able to sell the crop at the correct harvest stage or lose the sale, then taking a lower price is a better alternative than no return. Private consultants have taken a leading role in promoting and managing such deals.

Wheat has been an important crop for mixed farmers in the past. At its 1990/91 price, it has not been profitable to grow. ABARE has predicted a price of $186 per tonne in 5 years, in the absence of new trade wars. At that price, the Gross Margin would be $198 per ha. and $66 per ML. The cyclical nature of commodity price movements can make cropping more risky, but the rewards can be high.

Table 8. Crop Gross Margins at Proposed Water Prices - Year 5 and Year 15.
(1990/91 Commodity prices)

CROP (Water charges)	YEAR 5 GM/HA ($25/ML)	YEAR 5 GM/ML ($25/ML)	YEAR 15 GM/HA ($35/ML)	YEAR 15 GM/ML ($35/ML)
Winter Crops				
Wheat	-$36	-$11	-$66	-$22
Barley	$187	$94	$167	$84
Canola	$171	$114	$156	$104
Faba Beans	$241	$161	$226	$151
Summer Crops				
Sunflowers	$285	$38	$210	$28
Soybeans	$290	$34	$205	$24
Maize (grain)	$596	$70	$511	$60
Maize (sil.)	$721	$90	$641 ##	$80 ##
Sorghum	$170	$23	$96	$13
Millet	$155	$20	$75	$ 9
Lucerne Hay **	$710	$79	$620	$69

Of the summer crops, sorghum and millet are the worst affected by changes in water prices as they are both relatively low input crops. Water comprises a large proportion of total variable costs for these two crops.

In situations where water is the limiting input and cropping area is not limiting, efficiently irrigated winter crops appear more profitable than summer crops. However, where suitable cropping area is limiting and not irrigation water, then a small area of summer crop may contribute significantly to overall total gross margin. The correct management decision, in terms of optimum crop mix, will vary from farm to farm.

Faba beans, for example, have been grown this season on raised beds at the Tragowel Plains Demonstration Farm. The paddock was uncroppable in its natural state, with slopes of 1:2500 and poor soil structure due to sodicity. With the application of gypsum and an oat crop, permanent beds were able to be formed. Both barley and wheat were sown in 1990 and the gradual improvement in soil structure enabled Faba Beans to be sown in 1991. During the winter, the watertable, at very high salinity, was at the surface in the furrows between the raised beds. The crop will yield between 4 and 5 tonnes per hectare. At 4 t/ha, the gross margin will be $357/ha or $143/ML. The impact of appropriate management is very clear. The alternative was low producing pasture.

Is Cropping the Answer in the Shepparton Region?

Cropping in the Shepparton Region will be most successful on the larger mixed farms (> 200 ha.). They are most able to achieve economies of scale with technically sound cropping rotations which will not degrade the soil. These properties will have a mixture of irrigated pasture (predominately annual), dryland pasture, irrigated summer and winter crops and dryland winter crops. They would need to be already set up with suitable farming plant that can be adapted to the range of available crops. Any investment in new plant requires a detailed evaluation of the cash flow implications in both the short and long term. Alternatives, such as share farming, purchasing second hand equipment or contracting part of the operation should be evaluated.

In addition, better than district average yields must be achieved.

On the smaller mixed farms, say 100ha or less, the prospects of generating sufficient total gross margin from a technically sound cropping/livestock rotation is poor.

e.g. 100 ha with 300 ML water right plus 50% sales = 450ML

If the average gross margin per ha was $200 from a combination of livestock, summer and winter crops, the total Gross Margin is $20,000. This does not provide sufficient net income for a living allowance and all other farm business overheads. In some years it may be possible to exceed an average greater than $200/ha, but over the life of the rotation, including a grazing component, it may be difficult to exceed. For the smaller operator, off-farm income is important. Therefore management of the farm needs to be simple.

CONCLUSIONS

The successful implementation of salinity management plans in the irrigation areas of Northern Victoria requires a large, on-going investment by both government and the rural community. The ability of landholders to contribute their share is dependent on the present and future profitability of the alternative farm enterprises that can use the available land and water resources most efficiently.

The major contributor to real increases in farm production variable costs will be the proposed 4% per annum real increase in irrigation water charges as declared in the RWC Business Plan. It has been predicted that most other production inputs will either maintain their value in real terms or actually fall, e.g. electricity, fuel.

Dairying provides an efficient use of irrigated pasture and will be profitable provided the level of debt per cow is minimised for a given interest rate. At present water prices for an average herd, the maximum debt per cow which allows a living allowance of at least $20,000 is approximately $800 and $1200 per cow at 18% and 11% respectively. For a herd of 110 cows, the entire cash surplus (available for living) will be consumed at debts/cow of $1200, $600 and $350 at real water prices of $25, $30 and $35 per ML respectively (the expected 5, 10 and 15 year water plus drainage rates) at 18% interest. However the off-farm salinity mitigation works will have been payed for. None of the above estimates allow for replacement of productive assets on farm (depreciation).

Sole beef enterprises run on irrigated pasture can be profitable if the scale of operation is big enough (500-700 breeders). Beef enterprises will continue, in the

short term, to be an important adjunct to dairy operations by utilising poorer quality pasture. Beef can also be a low labour input enterprise on irrigated mixed farms and also smaller farms (including hobby farms) where there is a high component of off-farm income (by choice or necessity) adjacent to cities like Shepparton. Under proposed water price increases the gross margin per hectare (real 1992 $) for a Vealer Breeding enterprise will fall from $149/ha now to $12/ha in 15 years. At this level, beef production will not be viable.

Sheep enterprises run on irrigated pastures are unlikely to be profitable at present or future expected gross margins without a return to high prices.

Irrigated cropping provides a range of relatively profitable alternative enterprises for mixed farmers if full use of the flexibility that irrigation offers is harnessed. Summer crops are more susceptible to the proposed rises in water charges due to their higher irrigation water use than winter crops. Where water is limiting and not land, winter cropping will generate more total gross margin than summer crops. As water prices rise, the advantage of winter crops will increase. However, if the limiting resource is area of suitable cropping land and not water, it would be more advantageous to grow irrigated summer crops and thus generate a greater total gross margin.

The **singularly most significant factor** that will damage the viability of the irrigation industry is the impact that the proposed real increases in irrigation charges will have. In association with proposed drainage charges, most grazing enterprises will cease to be viable alternatives to dairying and therefore increase the financial risk of the pasture phase which is still an important component of a viable irrigated cropping rotation.

The proposed changes under the RWC Business Plan will **stifle the ability of the farming community to invest** in the necessary farm works for successful implementation of any of the Northern Victorian salinity management plans and place enormous pressure for structural change and adjustment out of current agricultural enterprises at a time when there are limited funds available to absorb the change. The social and environmental cost to the State may be very high.

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