IRRIGATION WATER IN ASHBURTON DISTRICT:

The Economic Value of Water at the Farm Gate

FINAL

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Contents

SUMMARY

1. Ashburton has a stock water scheme which is consented to take 8,281 L/sec from more than 20 sources, with the largest eight accounting for 79 % of the consents and the balance having a comparatively small and generally less reliable supply. It is estimated that only 326 L/sec, which is equivalent to 4 % of the total consented take, is required for stock use, while a further 5 per cent goes to domestic use including domestic irrigation. The remainder is lost via discharge at the ends of the race network (5 %), evaporation from the surface of the races and evapotranspiration from plants living adjacent to the races (4 %) and infiltration through the race lining (82 %).

2. If no water was lost, and if a change of use was allowed, and if domestic use was discontinued, then 7,955 L/sec could be used for irrigation. This is sufficient to irrigate 17,200 Ha to a depth of 4 mm / day[1], which is a generally accepted minimum for irrigated agriculture, with 4.5 mm being preferred.

3. In fact not all consented water is available all of the time, whereas irrigators need water to be available 95 % of the time. Lower reliability means that high investment land uses such as dairy become riskier, and a cut-off for acceptable is generally regards as 90 – 95 %. In this analysis a figure of 95 % has been assumed. OPUS[2] estimates that at least 4,410 L/sec is available for 95 % of the time. Deducting the 326 L/sec required for stock water means that about 4,080 L/sec is reliably available for irrigation. This is sufficient to irrigate 8,800 Ha at an application rate of 4mm / Ha / day.

Summary Table 1. Available Water and Irrigable Area

	Consented	Flow Reliability (m^3/day)
		95 %
8 Major Takes *	6,540	4,080
All Takes	8,281	4,080*
Less Stock Water	326	326
Available for Irrigation**		
L / sec	7,955	3,754
m^3 / day	687,000	324,000
Irrigable area - 4.0mm/Ha/day	17,200	8,100
- 4.5mm/Ha/day	15,200	7,200
- 5.0mm/Ha/day	13,700	6,500

* Balance of takes are considered not to be reliable

** Assuming no losses

4. Changing land uses associated with converting from dryland to irrigated land will increase Cash Farm Surpluses by an amount which depends on the uses. At one extreme, going from Dryland sheep and beef to Irrigated dairying increases Cash Farm Surplus by $3,660 / Ha / yr. At the other extreme, the increase in going from dryland cropping ($845 / Ha / year) to Irrigated Arable farming ($1,767 / year) is only $922 / ha

[1] 7,955 L/sec x 3,600 sec/hr x 24 hrs / day = 687 million litres or 687,000 m3 / day. 1 Ha @ 4 mm requires 40 m3 / day. Hence 687,000 m3 is sufficient to irrigate 17,183 Ha.

[2] OPUS "*Ashburton Stockwater Network.* August 2012. Table 4.10

/ year.

5. To calculate the maximum value of irrigation water at the farm gate, one must deduct from the increase in Cash Farm Surplus the increase in economic depreciation[3], the interest[4] cost of the extra capital invested to convert to irrigation, and the additional cost of farm management, as there is typically more work involved in managing an irrigated farm than a dryland farm. The residual increase might be termed "Increase in Net Return to Land". It is a significantly smaller number, and is strongly affected by the assumed return to capital required by farmers.

6. It is estimated that going from dryland sheep and beef to irrigated dairying, and assuming farmers require an 8 % return on capital, increases the Net Return to Land by $1,752 / Ha / year, while going from dryland arable to irrigated arable increases the Net Return to Land by $716 / Ha / year (see Summary Table 2). The weighted average increase in returns to land use across all land uses is estimated to be $1,100 / Ha / year. This increase is the maximum that a farmer might be expected to be willing to pay per year for water delivered to the farm gate.

Summary Table 1

	Dryland Sheep to Irrigated Dairy	Dryland mixed to Irrigated Arable	Dryland Sheep to Irrigated Sheep	Dryland dairy supp to Irr dairy supp	Weighted Average
1. % of Area	40	20	20	20	100
2. Increase in Net Farm Income * ($/Ha / yr)	3,435	716	1,597	1,183	2,100
3. Capital Cost of Conversion ** ($/Ha)	21,047	3,379	3,578	3,078	10,400
4. Annual Interest on conversion (8 %)	1,684	270	286	246	830
5. Max Value of water ($ / Ha / yr)	1,752	690	1,311	1,705	1,400
6. NPV Max Value of Water ($ / Ha)***	19,700	7,800	14,800	19,200	16,000

* Net Farm Income is Cash Farm surplus less owner's drawings less economic depreciation
** Includes dairy shares and changes in livestock numbers
*** At 8 % discount rate over 30 year project life.
Row 4 = Row 3 * 8 %.
Row 5 = Row 2 – Row 4.
Row 6 = NPV of Row 5 over 30 years at an 8 % discount rate.

7. These annual figures can be converted to a single Net Present Value (NPV) figure by discounting the future stream or increased revenue. Assuming an 8 % discount rate and a project life-time of 30 years, the NPV of conversion from dryland sheep to irrigated dairying is $19,700 / Ha, while the NPV of conversion from dryland arable to irrigated arable is $7,800 / Ha / yr. The weighted average across all land uses is $16,200. These increases are the maximum lump sums that farmers might be expected to be willing to pay for water delivered to the farm gate free of any other charge for 30 years.

8. Assuming that an irrigated farm requires 4.0 mm of water per day, and hence that the irrigable area is 8,800 Ha, the total Net Present Value of water at the farm gate is $143 million, assuming a 30 year project life and an 8 per cent discount rate. For comparing

[3] This is the true loss of value of an asset over time, as opposed to the taxable depreciation rate.
[4] We assume that the same return is required on equity as is paid on borrowings.

the results of this analysis with typical other irrigation projects, it is appropriate to use a 30 year life time and the 8 % discount rate which Treasury believes is appropriate for projects of this sort.

9. The difference in water value for different land uses means that it will be difficult to set up a charging regime to abstract all that value. If it is considered that all farmers should pay the same per Ha for water, and assuming that the charge has to be set at the $7,800 that which can be afforded by the lowest land use, the realisable value to the water supplier may be as low as $68 million.

10. Increasing the project life-time to 50 years increases the NPV of water at the farm gate to $21,000 / ha for dairying and $8,400 / ha for arable farming, and increases the weighted average value across all conversion types to $17,600 / Ha. The total NPV for 8,800 Ha is $155 million. A 50 year life time presumes that a resource consent for water abstraction could be renewed, and this is not guaranteed.

11. Changing the assumption regarding the rate of return on investment, and reducing the discount rate, to 5 per cent greatly increases the apparent value of water. In the case of dairying, the NPV of water to the farm gate increases to $37,000 per Ha for a 30 year project life, and in the case of arable the NPV rises to $12,000/ Ha. Over the total 8,800 Ha, the NPV is $240 million for a project with a 30 year life, and $280 million for a project with a 50 year life. Use of a 5 % discount rate is consistent both with farmer decision making and observable real interest rates[5].

12. The OPUS report quotes figures for piping water of $6,500 / Ha, which is considerably less than the calculated value of water for any land use. The cost for piping water to 8,100 Ha is hence $53 million. Consideration must also be given to the cost of continuing to provide stock water to all properties which are currently supplied by the scheme, and in not having water lost in that provision. This cost has been estimated at NPV $56 million. Hence the total costs of making water available for irrigation are $109 million, which is considerably less than the financial benefits estimated above. Consideration must also be given to any other social and environmental costs associated with converting open races to pipes, and intensifying land use.

13. The total benefits of providing irrigation water are hugely affected by the irrigable area, and the above calculations are based on estimates from OPUS of water availability for 95 % of the time[6]. This data would benefit from more detailed analysis and, particularly, from incorporation of data from the supplies for which flow measurements have only just begun. A storage scheme would also obviously greatly increase the irrigable area, albeit at a financial and environmental cost which has not yet been calculated but which may be significant.

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5 Returns on farm purchase prices have previously been shown to be 5 % or even less, and decisions to invest in assets with long lives, even though a shorter life assets at lower cost may be available, implies farmers use a comparatively low discount rate; Current real rates of interest are of the order of 4 %. Treasury recommends the use of an 8 per cent discount rate. While water rights are commonly given for 35 years, the general experience and community expectation is that they will be renewed. For a discussion of the issues see NZIER *Insight* no. 32/2011.

6 As opposed to the flow data in the OPUS report which refers to the amount abstracted, as opposed to available.

1. OVERVIEW

1.1 The Project

There are a number of stockwater races in Ashburton district which could be modified, probably by conversion to piping, to reduce current water losses. One option for use of the saved losses is for irrigation, and OPUS has asked Butcher Partners Ltd to assess the value of water at the farm gate to irrigated farms in the Ashburton district.

1.2 The Value of Water at the Farm Gate

Butcher Partners Ltd (BPL) has been asked by OPUS to estimate the value of irrigation water at the farm gate, and to express this on a per Ha basis. This value is determined by the change in land use and profitability that irrigation enables, and the capital investments required to enable these changes in land use. The value also depends on the mix of current dryland uses and future irrigated land uses, which must reflect the compatibility of land uses with the irrigable land.

The value of irrigation water at the farm gate can be further split into two parts. The first part is the cost of getting the water to the farm gate, which in this instance is the cost of installing a piping network which will enable the current losses to be avoided. There may also be a cost of developing storage, if that is deemed to be the most cost-effective means of getting water for irrigation[7].

The second part of value is the residual value, being the value of the water at the intake to the irrigation pipes and storage system which are proposed. This latter value is what needs to be balanced against any change in social and environmental benefits and costs associated with abstracting the water and piping it. That is, water may be worth $10,000 / Ha at the farm gate, but if it costs $6,000 / Ha to get it there, then the net commercial value of the water at the intake point is only $4,000 / Ha. Note that this is the Net Present Value of the series of financial benefits in each future year, not the annual benefit per year.

1.3 The Process

To undertake this analysis, appropriate farm budgets were established for dryland and irrigated farms. The difference in economic farm surplus was estimated, and this is assumed to be the maximum value which a farmer attributes to additional water at the farm gate. Irrigation provides not only a higher financial return but also reduced fluctuations in annual income. This reduced variability has value to risk-averse farmers, and that value is an additional benefit to irrigation. That benefit has been ignored here.

The increase in farm surplus was calculated for a number of conversion scenarios (e.g. from dryland sheep to irrigated dairy), and for each of these scenarios a capital cost of farm

[7] This option is implied by the OPUS analysis of the total water surplus over a year, whereas the irrigating season is closer to six months.

conversion was estimated. An 8 % annual interest[8] charge for this additional capital was deducted from the increase in farm surplus and the balance was assumed to be the maximum value per year that farmers placed on water at the farm gate. The stream of future annual values per year was assumed to continue for 30 years, and this stream was converted to as single Net Present Value, assuming an 8 per cent discount rate, with sensitivity testing of a 5 per cent rate and a 50 year stream of benefits.

1.4 Structure of the Report

Section 2 of the report describes the data sources and their reliability, while section 3 begins by describing the potential water availability, based on data from OPUS about current abstraction and use in the existing stockwater network. From this data a potential irrigable area is calculated.

Section 4 contains a series of farm operating budgets, and from this we calculate the net increase in annual farm surplus arising from various changes in land use from dryland to irrigated land. A capital cost of conversion for each land use change (e.g. dryland sheep to irrigated dairying) is estimated, and an 8 % annual charge on capital is calculated and deducted from the increase in farm surplus. A weighted average value is calculated on the basis of estimated current and expected future land use mixes.

Section 5 contains calculations of Net Present Values per Ha for water. These are based on the series of annual benefits and two discount rates; 5 % and 8 %. The value per year and NPV for the entire irrigated area is calculated by multiplying the benefit per Ha by the number of irrigable Ha. This value is then compared to the broad average cost of piping irrigation water. OPUS states that this cost is $6,500 per Ha, or $53 million. In additional there are significant costs involved in providing water beyond the irrigated area in order to save the water that is currently being lost in the wider distribution system. This cost is estimated to be NPV $54 million, consisting of a capital cost of $210 / Ha over 227,000 unirrigated Ha plus an annual operating cost of $370,000[9].

[8] More formally, this is the Weighted Average Cost of Capital, or the opportunity cost of capital. Sensitivity testing was done on 5 %, reflecting long term returns to investments in farm land.

[9] *Per comm.* Greg Birdling. OPUS

2. DATA SOURCES AND ANALYTICAL LIMITATIONS

2.1 Water Availability

Data on water availability and use was provided by OPUS[10]. Flow data is available for only 8 of the 27 intakes, which account for 79 % of the consented take. Flow data was downloaded monthly, and while it is now measured every 15 minutes for the three largest intakes, it is not clear what the frequency of recording was over the long term historical record. In any case the actual flow does not indicate available flow. OPUS[11] estimates that the 8 metered intakes provide 4,410 L/sec with 95 % reliability. Although there are a further 19 intakes, OPUS advise that they provide little extra flow at 95 % reliability.

2.2 Capital Costs

OPUS has provided a broad average figure of $4,000 – 6,500 / Ha for piping irrigation water, and it has been assumed that for the area in question the cost is most likely to be $6,500, reflecting the diverse nature of the intakes. For the estimated 8,100 Ha which could be irrigated (see section 3 of this report), the capital cost of piping irrigation water to the farm boundary is estimated to be $53 million.

This figure does not take into account the extent of providing an alternative stock water supply through the balance of the currently serviced area. OPUS estimate that the price of an alternative stockwater system will be $210 / Ha over the 235,000,currently serviced by the scheme[12], plus an annual cost of $370,000. The NPV of this alternative stock water system is $56 million.

Hence the total capital cost for piping irrigation water and supplying alternative stockwater is estimated to be $109 million.

2.3 Farm Budgets

Farm budgets were provide by Agribusiness Group, and are based on 2012 MAF Farm monitoring budgets, except that farm gates prices for outputs are based on an 8 year moving average being the last four years of historical prices, an estimate of prices for the current year, and MAF forecasts of prices[13] for the next three years. This is done to smooth out the volatility of commodity prices, which otherwise indicate price affordability going from perhaps $20,000 / Ha in one year to $5,000 / Ha two years later[14].

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10 OPUS "*Ashburton Stockwater Network.* August 2012.

11 *Pers. Comm.* Greg Birdling OPUS

12 Assumes that the 8,800 irrigated Ha will still need a stand-alone stock water scheme.

13 MAF. SONZAF Report. *State of New Zealand Agriculture Futures*

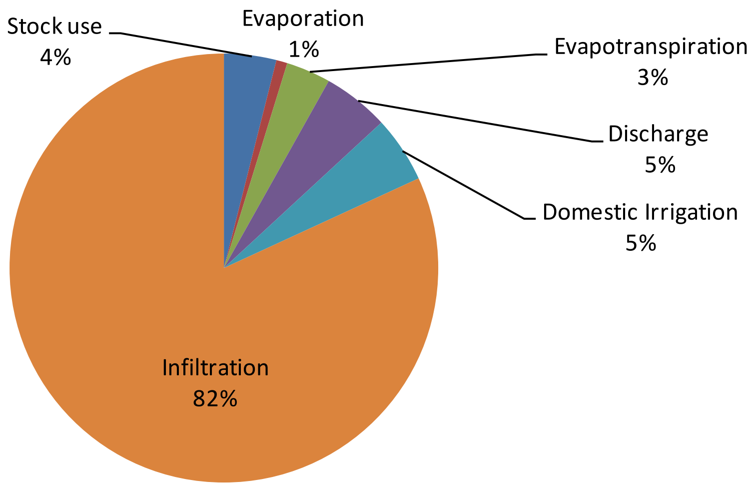
14 This volatility is the result of affordability being defined as the residual between revenue on the one hand and all operating costs, including interest on additional farm investment, on the other. So for example dairying revenue is $10,600 per Ha, direct costs including drawings, depreciation and interest on the extra investment is $3,680 per Ha. The residual available to pay for water is $2,383. If costs go up 5 per cent and the price of milk solids goes down 10 %, then the residual available to pay for water goes down by $1,390 or 58 %.

3. DEMAND FOR AND AVAILABILITY OF WATER

3.1 Demand For Water

OPUS has done a water balance for the scheme when it is abstracting at the consented level (see Fig1). The stock use is based on an allowance of 120 L/ Ha / day, and assumes that all of the 235,000 Ha covered by the scheme take stock water from the scheme. Estimates were made of the other water uses and losses, with the residual being, by definition, lost to infiltration.

Figure 1 Water use from Ashburton Stockwater scheme



3.2 Supply of Water

Opus assessed the historical records available from the seven largest intakes (Cracroft was excluded from this assessment). The flow taken varies seasonally as the intakes are usually throttled back during wetter periods as demand is lower and there are also inflows throughout the network from stormwater. The distribution of flows is shown in Table 2, but this does not represent the reliability of the sources supplying the network so much as the demand characteristics of the network.

Opus have made an assessment of reliable flow available based on the 100-year low-flow characteristics of the rivers in question, and an assessment of historical flows during the peak of the summer season. The estimated flow available is 4,410 L/s. Deducting the stockwater demand from this (326 L/s) gives a total potentially available for other uses of about 4,080 L/s.

Table 1 Distribution of total abstraction across the seven intakes (L/s). (percentage of time that abstractions are above specified values.)

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	5362	4878	4733	4660	4592	4532	4489	4454	4421	4369
10	4313	4266	4240	4198	4163	4123	4090	4057	4023	3998
20	3976	3953	3931	3903	3879	3860	3846	3830	3811	3791
30	3773	3754	3736	3718	3697	3680	3665	3646	3626	3608
40	3589	3571	3547	3521	3491	3471	3457	3440	3425	3405
50	3387	3370	3352	3334	3317	3293	3265	3242	3220	3198
60	3174	3155	3138	3117	3089	3067	3042	3017	2995	2976
70	2957	2929	2908	2882	2856	2830	2811	2787	2760	2737
80	2713	2674	2647	2608	2581	2554	2518	2487	2463	2444
90	2422	2404	2389	2372	2354	2332	2309	2272	2212	2143
100	1599									

Note: Each row contains figures for the decile and the intermediate values. E.g. the row labelled “20” has the values for 20 – 29 % .

3.3 Irrigable Area

The irrigable area depends on the required quantity and reliability of water supply, and for the purposes of this exercise the base case assumes 4 mm of water / day and 95 % reliability. While the seven intakes abstraction exceeds 2,332 L/sec of water for 95 per cent of the time, OPUS estimate that significantly more would be available for abstraction. OPUS estimates that the 8 monitored supplies had at least 4,410 L/sec available for 95 % of the time. OPUS also advises that the other 19 takes would generally be less reliable and without flow data to prove otherwise should be excluded for this assessment.

Assuming no losses in transmission and deducting the actual stock water requirement, estimated to be 326 L/sec[15], gives residual water potentially available for irrigation of 4,080 L/sec, which is equivalent to 352,000 m^3 / day. If we assume irrigators require 4.0 mm of water per day, this demand is equivalent to 40 m3 / ha / day. Hence the available supply is sufficient to irrigate 8,800 Ha.

A higher water requirement per Ha will lower the irrigable area correspondingly. A lower reliability would raise the irrigable area.

[15] 120 litres / Ha / day over 235,000 Ha = 28.2 million L/day = 326 L / sec

4. FARM BUDGETS

Detailed farm budgets were provided by The Agribusiness Group. They were derived from appropriate MAF farm monitoring budgets for 2012, but were modified by setting the product prices equivalent to medium term average prices. The purpose of this is to remove some of the volatility from product prices and to try and establish long-term values for irrigation water.

Detailed budgets are shown in Appendix 1 but are summarised below. The increase in Cash farm surplus varies between $920 and $3,660 / Ha / year. To calculate the increase in Net Farm Income, one must deduct from the increase in Cash Farm Surplus the increase in economic depreciation[16], the interest[17] cost of the extra capital invested to convert to irrigation, and the additional cost of farm management, as there is typically more work involved in managing an irrigated farm than a dryland farm. This residual increase might be termed "Increase in Net Return to Land". It is a significantly smaller number, and is strongly affected by the assumed return to capital required by farmers.

As is shown in Table 4.1, the increase in Net farm income varies between $690 and $1,750 / Ha / year. This is in principle the maximum amount that a farmer would be willing to pay to have water delivered to the gate. Any more than that and conversion would not be worthwhile.

Table 4.1 Increased Cash Farm Surplus and Net Farm Income

	Dryland Sheep to Irrigated Dairy	Dryland Arable to Irrigated Arable	Dryland Sheep to Irrigated Sheep	Dryland dairy supp to Irrigated dairy supp	Weighted Average
1. Increase in Cash Farm Surplus ($/Ha/yr)	3,660	920	1,670	1,260	2,230
2. Increase in Net Farm Income * ($/Ha/yr)	3,435	716	1,597	1,183	2,100
3. Capital Cost of Conversion ** ($/Ha)	21,047	3,379	3,578	3,078	10,400
4. Annual Interest on conversion (8 %)	1,684	270	286	246	830
5. Net increase in income = Max Value of water ($ / Ha / yr)	1,752	690	1,311	1,705	1,400

* Net Farm Income is Cash Farm surplus less owner's drawings less economic depreciation
** Includes dairy shares and changes in livestock numbers
*** At 8 % discount rate over 30 year project life.
Row 4 = Row 3 * 8 %.
Row 5 = Row 2 – Row 4.

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16 This is the true loss of value of an asset over time, as opposed to the taxable depreciation rate.
17 We assume that the same return is required on equity as is paid on borrowings

5. NET PRESENT VALUES

These annual figures can be converted to a single Net Present Value (NPV) figure by discounting the future stream or increased revenue. Assuming an 8 % discount rate and a project life-time of 30 years, the NPV of conversion from dryland sheep to irrigated dairying is $19,700 / Ha, while the NPV of conversion from dryland arable to irrigated arable is $7,800 / Ha / yr. The weighted average across all land uses is $16,200. These increases are the maximum lump sums that farmers might be expected to be willing to pay for water delivered to the farm gate free of any other charge for 30 years. Assuming a land use distribution of 40 % dairy and 20 % for each of the other three land uses means that the average benefit is $1,440 / Ha / year with a Net Present Value of $16,200 and a total value over 8,800 Ha of $143 million. Increasing the life time to 50 years increases the NPV to $155 million (see Table 5.1).

Table 5.1 Net Value of Irrigation before payment for Distribution and Water (8 % Interest rate and 8 % discount rate)

Land Use	Land Use Mix Assumed	Annual Benefit ($ / Ha/ yr)	NPV ($ / Ha)	
			30 yrs	50 yrs
Irrigated Dairy	40 %	1,750	19,700	21,400
Irrigated Arable	20 %	690	7,800	8,400
Irrigated Sheep Finishing	20 %	1,310	14,800	16,000
Irrigated Dairy Support	20 %	1,700	19,200	20,800
Total / Weighted Average	100 %	1,440	16,200	17,600
Total for 8,800 Ha		12,700,000	143,000,000	155,000,000

If the interest rate on the additional on-farm capital investment is reduced to 5 %, the annual benefit per Ha increases accordingly and the weighted average across all land uses is $27,000. The NPV of the water delivered to farms is now $240 million for a project with a 30 year life time and $280 million for a project with a 50 year life time.

Table 5.2 Net Value of Irrigation before payment for Distribution and Water (5 % Interest rate and 5 % discount rate)

Land Use	Land Use Mix Assumed	Annual Benefit ($ / Ha/ yr)	NPV ($ / Ha)	
			30 yrs	50 yrs
Irrigated Dairy	40 %	2,380	36,600	43,500
Irrigated Arable	20 %	790	12,200	14,400
Irrigated Sheep Finishing	20 %	1,420	21,800	25,900
Irrigated Dairy Support	20 %	1,800	27,600	32,800
Total / Weighted Average	100 %	1,760	27,000	32,000
Total for 8,800 Ha		15,400,000	240,000,000	280,000,000

These NPV values per Ha are all well above OPUS's estimated $109 million costs for piping irrigation water and providing an alternative stockwater supply.

APPENDIX 1 FARM BUDGETS

Dryland Farm Budgets

	Arable	Sheep and Beef	Dairy Support
REVENUE			
Cropping	1,136		
Sheep	537	913	
Beef		148	
Dairy Support			1,840
Total	**1,673**	**1,061**	**1,840**
FARM WORKING EXPENSES			
Livestock Purchases	45	110	-
Wages	54	47	50
Animal Health	18	43	45
Breeding	-	-	-
Shed Expenses	-	-	-
Electricity	7	9	9
Feed	15	29	200
Fertiliser	250	132	132
Freight	18	13	13
Seeds	50	20	31
Shearing	26	66	-
Weed and Pest	150	33	33
Fuel	54	41	41
Vehicle	40	33	33
Repairs & Maint	50	23	23
Rates	15	11	11
Communication	7	5	5
Insurance	12	9	9
Acct, Legal,Cons	9	10	10
Administration	5	4	4
Other	3	2	2
Irrigation	-	-	-
CASH FARM EXPENDITURE	**828**	**641**	**652**
CASH FARM SURPLUS	**845**	**421**	**1,188**

Irrigated Farm Budgets ($ / Ha)

	Dairy	Arable	Sheep Finishing	Dairy Support
Revenue				
Milksolids	10,040			
Crop		3,024		
Sheep		721	5,643	
Dairy Grazing		153		3,795
Beef	550		300	
Other	31	121		
Total	**10,590**	**4,019**	**5,943**	**3,795**
FARM WORKING EXPENSES				
Livestock Purchases	31	383	2,539	-
Wages	1,211	168	183	50
Animal Health	377	14	101	45
Breeding	189	-	-	-
Shed Expenses	79	-	-	-
Electricity	377	99	45	42
Feed	2,218	51	27	400
Fertiliser	802	395	307	290
Freight	31	75	59	13
Seeds	63	112	94	90
Shearing	-	15	41	-
Weed and Pest	31	317	89	84
Fuel	126	122	96	45
Vehicle	126	93	64	38
Repairs & Maint	503	123	54	100
Rates	68	40	20	20
Communication	24	14	8	8
Insurance	56	32	25	25
Acct, Legal,Cons	49	16	13	13
Administration	53	28	7	7
Other	50	80	4	4
Irrigation	75	75	75	75
CASH FARM EXPENDITURE	6,540	2,252	3,851	1,349
CASH FARM SURPLUS	4,050	1,767	2,092	2,446