A COMPARISON OF FARMING SYSTEMS PROFITABILTY: 2002 - 2006

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Key Messages

- **Farming systems with greater reliance on livestock performed better than more cropping intensive systems over the last five years.**
- **The lower income and lower cost perennial pasture system was found to be the most profitable under the assumptions made.**
- **Dry conditions over the last five years have generally played havoc with the performance of cropping intensive systems, particularly the continuous cropping system.**
- **Because of this, we suggest that the results provide more guidance about the robustness of farming systems during extended dry conditions rather than average conditions so keenly sought**.

Background

Farming is a complex business. Much of the complexity comes from uncertainties about agricultural responses to management decisions and the biological and economic interactions between one component of a farm and another. The core site trial developed by the CWFS attempts to capture some of these realities and provide an indication of how the different systems compare in physical and economic terms. This paper reports on the profitability of the four systems over the last five years, covering the 2002-06 period. The four systems are as follows:

- **Traditional**: A mixed farming system relying on tillage and livestock for weed control. The five year rotation consists of LF Wheat followed by SF Wheat undersown with pasture followed by 3 years of pasture;
- **Reduced tillage**: A mixed farming system that grows wheat crops on long fallow. The five year rotation consists of LF Wheat followed by a rest year followed by LF Wheat undersown with pasture followed by 2 years of pasture;
- **Continuous cropping**: A no tillage intensive continuous cropping system relying solely on herbicide applications for weed control. The five year rotation consists of Canola followed by SF Wheat followed by Pulse crop followed by SF Wheat followed by Green manure crop;
- **Perennial pasture** – a rotational grazing system based on the cell grazing principle.

Approach

A standard gross margin budgeting approach is taken to assess annual returns from each land use within each farming system over the 2002-06 period. The analysis uses data provided by CWFS staff on the input and outputs of the four systems during this period. With four replicates of each of the four farming systems and five specific rotations within each farming system, the performance of 80 plots has been monitored by the CWFS group each year. With this evaluation covering the last five 5 years, we are dealing with a significant amount of data covering effectively 400 plots. The treatment of income and variable costs from crop and livestock activities undertaken on the core site is described below.

Cropping

The incomes from cropping activities on the core site are based on crop yields obtained directly from CWFS for each of the 80 plots. A summary of the main crop yields from 2002 to 2006 for each farming system is given in Table 1. The prices applied to the crop yields are based on best estimates of price that could be made for that year. Wheat prices were based on annual AWB estimated silo returns at Condobolin for each year from 2002-03 through to 2006-07.

The prices are based on a matrix and reflect the level of protein and screenings recorded from wheat obtained from each plot. Prices for barley, canola, lupins and fieldpeas drew on a mixture of locally sourced prices obtained by CWFS staff around the time of harvest and average prices reported by ABARE when no local estimates were available.

The variable costs of cropping activities within each farming system were based on information provided by CWFS on the physical quantity of inputs applied. A standard set of input prices (eg herbicides, fertilisers etc) was used across all years to simplify the calculation of costs. Machinery costs were based on the use of owner operated equipment based on calculations provided in NSW DPI's gross margin budgets - with the exception of harvesting that used a contract rate.

Table 1: Core site crop yields (t/ha) – sourced from CWFS

Farming system	Crop			Year			
		2002	**2003**	**2004**	**2005**	**2006**	**Av**
Traditional	LF wheat	0.44	0.7	0.55	1.26	0.28	0.65
	SF Wheat u/s	0.73	0.86	0.65	1.27	0.05	0.71
Reduced tillage	LF wheat	0.14[1]	0.84	0.47	1.19	0.21	0.57
	LF Wheat u/s	0.43	1.02	0.53	1.29	0.2	0.69
Continuous cropping	SF Wheat aC	0.6	0.26	0.85	2.50[2]	0.00[2]	0.84
	SF Wheat aP	0.73	0.93	0.76	1.63	0.19	0.85
	Canola	0.08	0.36	1.16[3]	1.49[3]	0.22[3]	0.66
	Peas	0.13	0.18	0.91	1.67	0.00	0.58

[1] Low yield as a result of herbicide damage

[2] Barley substituted for wheat after canola to avoid wheat-wheat sowing

[3] Wheat sown in replace of Canola because of lack of sowing rains occurring in time

Livestock

This calculation of the contribution that livestock makes to the profitability of the three farming systems involving pasture (traditional, reduced tillage and perennial pasture) is a major challenge. The main challenges arise from lack of data about livestock performance in the early years of the core site trial, the wholesale replacement of stock in 2002 and the dry conditions in recent years leading to the stock being off the trial site for extended periods of time.

Despite these problems, and given the importance of livestock to farming systems in the Central West, we estimated livestock returns for the trial site using the approach described below.

Stocking rates were estimated by CWFS staff for each farming system over each year of the trial (Table 1). Income and variable costs per dse were estimated for each year based on a NSW DPI Merino wether gross margin budget adjusted for:

- average micron and wool cuts (reflective of average conditions for the trial site) across all years
- historical wool prices for respective wool types (MF22 for fleece and MP22 for pieces) for each year
- average replacement values and CFA prices across all years

The resulting income and variable costs per dse were then multiplied by the average stocking rates to determine the per hectare return for livestock activities on the three farming systems involving livestock. In mixed farming systems, these values were then combined with cropping returns to estimate system profitability.

Table 2: Estimated stocking rates for core site

Year	**Traditional** (dse/ha)	**Reduced tillage** (dse/ha)	**Perennial pasture** (dse/ha)	**Seasonal conditions comment**
1998	0.00	0.00	0.00	Establishing pastures
1999	0.80	0.60	1.75	Half grazing year - good finish
2000	1.60	1.20	3.20	Early break - follow up rains
2001	1.60	1.20	3.20	Early break - good spring
2002	1.00	0.80	2.40	Early break - poor spring
2003	0.80	0.60	1.10	No autumn break
2004	0.20	0.60	1.10	No autumn break
2005	0.80	0.60	1.10	No autumn break
2006	0.80	0.60	1.00	Pasture declining in perennial pasture system

Results

Average profitability

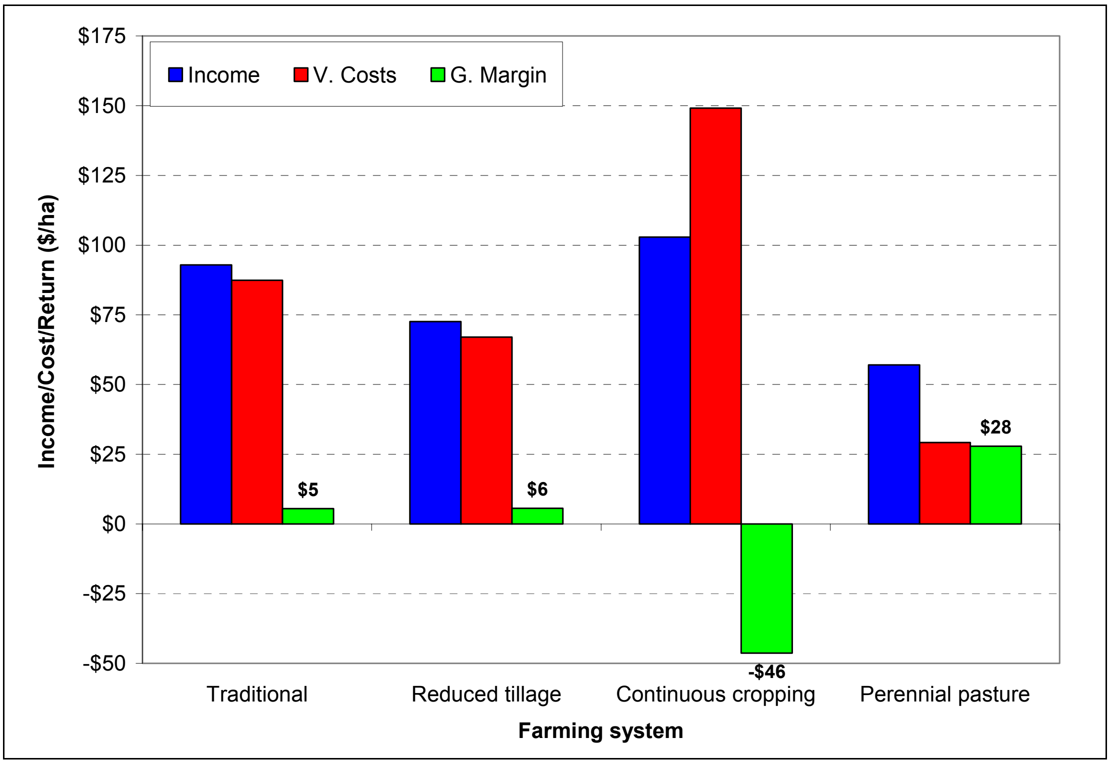
The average profitability of the four farming systems at the core site is provided in Figure 1. The continuous cropping system has performed the worst out of the four farming systems assessed. This result is not surprising given the dry conditions over much of the last five years.

Whilst the income provided is the highest obtained of all the system, the cost of the continuous cropping system is roughly double that of other systems and this results in relatively poor performance and a negative gross margin of -$46 per ha.

The traditional and reduced tillage systems were found to have similar but low levels of low profitability ($5 to $6 per ha) as each other. The traditional system has a slightly higher cropping frequency relative to the reduced tillage system. This increases both income and costs but the margin remains similar. The perennial pasture system is found to be the most profitable over the five year period.

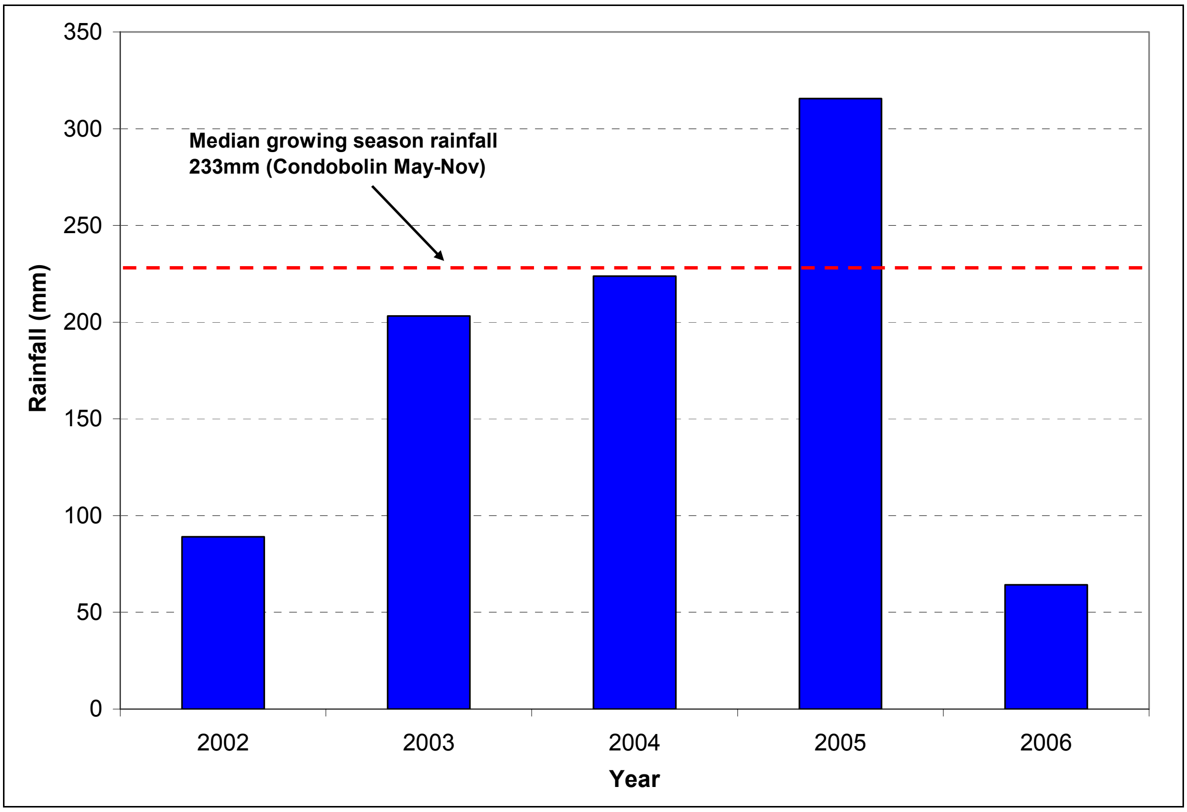
It has the lowest income of all systems but also has the lowest costs. This results in it providing a better net return compared to the other systems containing an element of cropping. As outlined above, we have had to make a number of assumptions to derive a value for livestock returns so some caution should be used in interpreting the results.

Figure 1: Income, variable costs and gross margin returns of core site farming systems 2002 to 2006



The results need to be considered in light of the dry conditions experienced over much of the last five years. Only in 2005 did growing season rainfall exceed the median rainfall (Figure 2). Furthermore, growing season rainfall in Condobolin during two of the years assessed (2006 and 2002) were the second and third lowest totals received in the last 117 years (from 1890 to 2006). Livestock based systems are likely to offer better returns than cropping under such dry conditions.

Figure 2: Growing Season Rainfall at Condobolin - 2002 to 2006



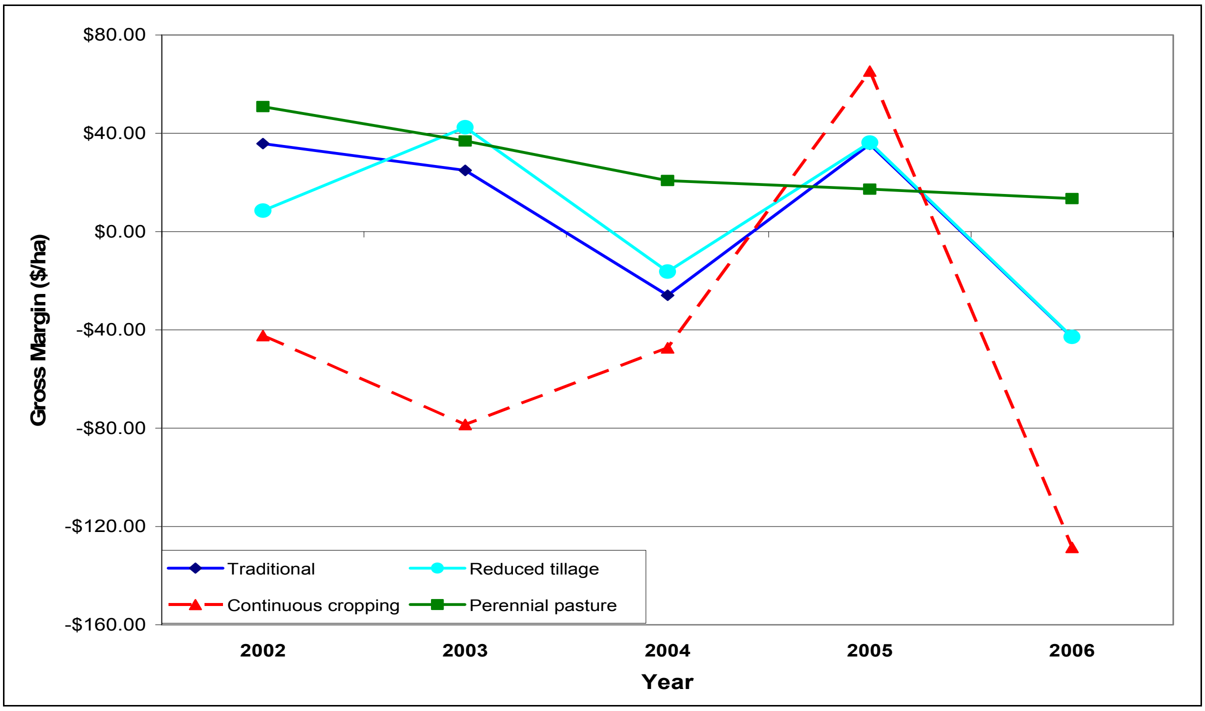
Variability in profitability

The profitability of the four farming systems varies substantially from one year to the next (Figure 3). The continuous cropping system shows the greatest level of variability and is perhaps more influenced by changes in growing season rainfall. It achieves the highest level of profit of any system in 2005 but also achieves the lowest in the following year of 2006 largely due to failures in two of its cropping activities - peas and SF Wheat aC .

The traditional and reduce tillage systems show similar changes in profitability from one year to the next. Both of these systems record negative returns in two years out of the five. The perennial pasture system shows the least variation[1] and also a steady decline in profitability. The steady decline arises from the gradual decline in pasture productivity as the pasture phase has worn on and a decline in assumed stocking rates.

[1] This may reflect the way in which the livestock returns have been estimated as well.

Figure 3: Annual profitability of core site farming systems 2002 to 2006



Conclusion

Farming systems on the core site which have a greater reliance on livestock have performed better than more cropping intensive systems over the last five years. Seasonal conditions have been poor over this period suggesting that the results may not be a good reflection of the typical performance of the four systems.

Perhaps the results provide more guidance about the robustness of farming systems during extended dry conditions rather than the elusive average conditions. It is hoped that nature might select from above average conditions next year!

An additional qualification is that the results should be applied carefully because land, labour and capital constraints will affect the profitability of each of the farming systems when applied at the farm scale.