



IRRIGATION RESEARCH & EXTENSION COMMITTEE

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FOR IRRIGATION CROPPERS

Positioning 8 tonne wheat in the farm system

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Take home messages

A range of irrigated wheat management systems may be used on the one farm in any one season.

Wheat direct drilled into rice with or without a spring irrigation has the best gross margin profit per megalitre and has been suited by the lack of winter waterlogging during the drought years.

Single spring irrigation is suited to rice and non rice rotations with 8 tonne systems suited to better soils in non rice rotations.

The single spring irrigation system was developed in the late 90s from the Logie Brae Landcare project results of watering all crops once to maximise gross margin /ML on a farm basis and target 4-5t/ha yields and has been widely used particularly during the drought years.

Although water use and cost of 8 tonnes is much higher than the other systems gross margin/ML is higher than the one spring irrigation system. Up front costs are not much higher. Most of the extra costs come after the first node growth stage when yield potential and decisions on spring irrigations are better known.

A good season after sowing may allow an unplanned change from a 5 tonne target to 8 tonne target because the crop just happens to have the ideal window of 500-800 shoots/m² at first node.

The dilemma

Low drought induced irrigation allocations and low winter and spring rainfalls over the last five years have led to farmers using water to irrigate wheat and other winter crops for survival in spring. This had often been on the basis of keeping the crop alive and hoping for big rains to substitute for another irrigation or increase allocations. These decisions have been on the basis of \$ income per megalitre of water. It has been about looking after what you have (winter crops and pastures) than saving water for rice. Under these conditions the concept of managing and allocating water for 8 tonnes/ha wheat is out of the question. The only growers able to target 8 tonnes have been the bore pumpers in the Hillston and Darlington Point district who have achieved crops with 8-10t/ha yields.

Most farmers would agree average irrigation allocations between 50-80% are needed for farm viability. The decision on how this should be allocated between winter crops and rice and other summer crops to maximise farm profitability is a big issue. Is the best option to use the late 90s Logie Brae Landcare project results of watering all crops once to maximise gross margin /ML on a farm basis and target 4-5t/ha yields or is the optimum a mix of Logie Brae and 8 tonne management?

Wheat management systems

Farm size, soil type, layout, farmer preferences and water allocations determine the farm enterprises, intensity of irrigations, wheat management systems and rotations on any one farm. The profitability and sustainability of rice farm systems report (1996) found farmers in the Eastern Murray Valley were operating four different rotations on the one farm according to rice soil classification. Current irrigation company policy of setting seasonal rice water use targets with an allowance of 4MI/ha has led to rice and non rice rotations on the one farm. Single spring irrigation wheat is suited to rice and non rice rotations with 8 tonne systems suited to better soils and layouts in non rice rotations.

These factors have resulted in a range of wheat management systems often used on the one farm in any one season. The wheat systems may be either:

- Irrigation layout not watered
- Direct drill into rice stubble
- Direct drill into rice stubble with one spring irrigation
- Water up or pre-water only

One spring irrigation only - this is the Logie Brae Landcare system

Multiples of spring irrigations

Pre-water and multiples of spring irrigations

Pre-water and 3 spring irrigations - this is the 8 tonne system

Wheat system water use

In Figure1 the irrigation and total rainfall and irrigation water use is compared for a number of wheat systems with yield based on a water use efficiency of 20kg/mm. The unwatered irrigation layout water use is based on a short fallow and growing season median rainfall for Griffith of 320mm. The direct drill wheat into rice includes the 125mm left from the rice. Pre-irrigation or watering up is based on 125mm and spring irrigations 100mm. Yield is based on the effective water corrected for 110mm evaporation and 75% irrigation efficiency for pre-irrigation and spring irrigations.

The yields of the double crop direct drill wheat into rice with or without a spring irrigation at 4.6t/ha and 6.1t/ha are excellent and confirm the popularity of this simple system in the last few drought affected seasons. The direct drill has the same or better yield than pre-irrigation alone or one spring irrigation system. The pre-irrigation and three spring irrigations uses more water at 409mm but produces a good yield response of 8.2t/ha.

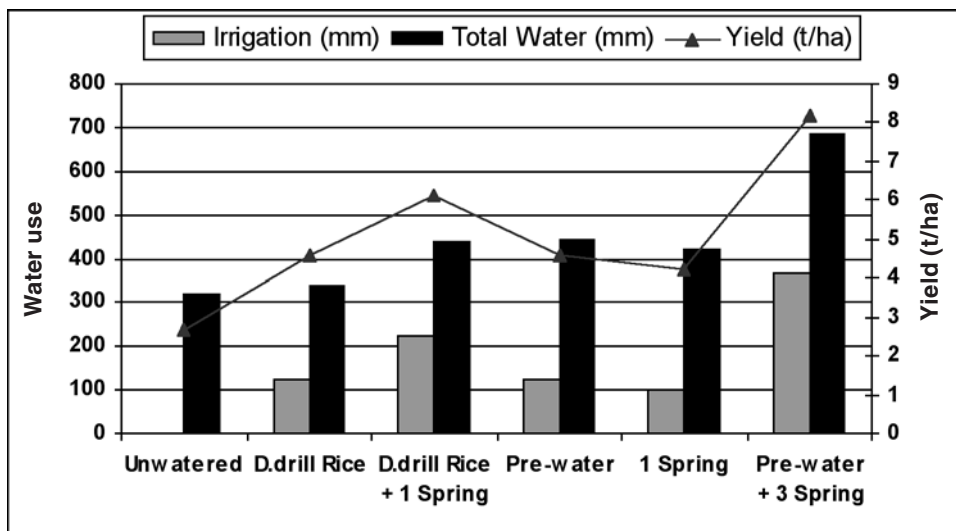


Figure1. Irrigation, total irrigation and rainfall water use of wheat systems and potential yield at 20kg/mm/ha water use efficiency.

Profitability of the wheat systems

Each wheat system has its advantages and disadvantages with water allocation and the watering and drainage time of the layout having a major influence. As Figure 2 shows direct drill rice with or without a spring irrigation has the best gross margin profit per megalitre. The gross margin/ML is based on the total water delivered to the crop as rainfall and irrigation with evaporation losses not included. Although the 8 tonne system uses more water at 685mm compared to the one spring irrigation at 420mm the gross margin per megalitre is higher. The high variable cost for 8 tonnes seems to be a large disadvantage compared to the other systems but most of the extra expenditure occurs from the first node stage onwards when decisions for extra expenses can be made more confidently.

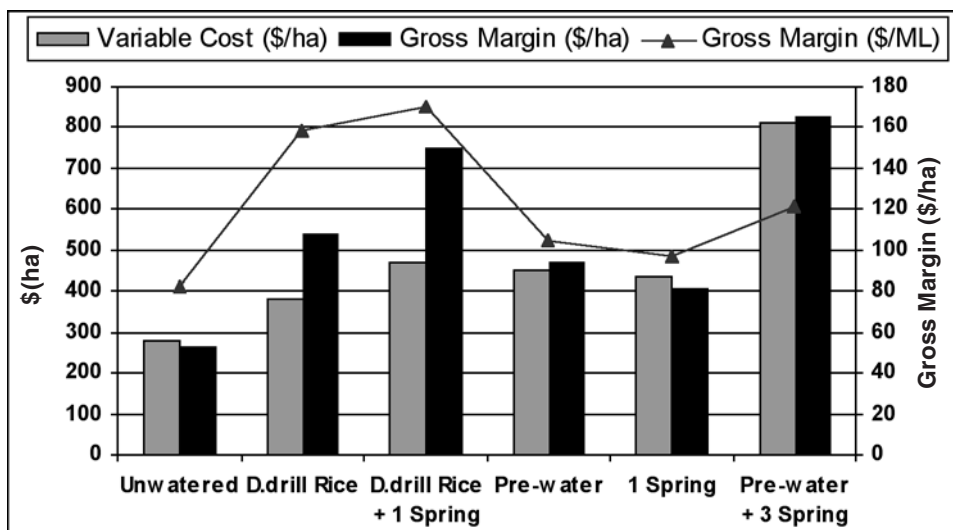


Figure 2. Variable costs, gross margin/ha and gross margin/ML for each system.

Up front costs not much higher

One advantage of the 8 tonne system is the costs up to the first node stage are not much higher for growing 8 tonnes compared to 4–5 tonnes yields (Table 1).

Table 1. Extra variable costs/ha for 8 tonnes compared to 4–5 tonnes yield up to first node growth stage and at harvest

	Extra \$ variable costs/ha for 8 tonnes compared to 4–5 tonnes yield
Pre-irrigate or water up	33
Pre-sow urea	34
Sowing fertiliser	12
Total extra costs up to 1st node stage	79
1st N topdress	-15
2nd N topdress	134
Spring irrigations	52
Harvest, insurance and levies	79
Total extra costs 1st node to harvest	250

Eight tonnes not planned but season suits shoots

There may be seasons where the one spring irrigation 4–5 tonne system is planned but the season picks up between sowing and first node stage. The crop just happens to have the ideal shoot count of 500–800 shoots/m² for 8 tonnes at the first node stage. The crop looks good, wheat prices are high, stripe rust is under control and irrigation allocations are high enough to allow three spring irrigations. On this basis assuming the crop is on a good irrigation layout the crop can be managed for 8 tonnes. Nitrogen management (Table 2) and timely spring irrigations using enviroscans or gypsum blocks are essential. Refer to the NSW DPI primefact "Growing eight tonnes a hectare of irrigated wheat in southern NSW".

Table 2 Nitrogen topdressing recommendations based on shoot counts for 8 tonnes

Shoots/m ²	1st node kgN/ha	Booting to head emergence kgN/ha
400	–	–
500	50	90
600	40	60–90
700	0–30	60–90
800	0	60–90