



Farmnote

Options to consider at harvest

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Lupin harvest

New grain harvesters can cost in excess of \$500,000; so the costs of ownership are substantial. Should a farmer always own their harvesting gear? What are the alternatives? What factors should farmers consider when deciding their investment in harvesting machinery and capacity? This farmnote canvasses these issues.

The factors to consider when deciding about investment in harvest capacity include (but are not limited to) the:

- cost, availability and reliability of harvest contractors
- cost and availability of renting harvesters
- attractiveness of different lease finance options for harvesters
- cost of complementary investment in on-farm storage to reduce logistic delays
- costs and problems with sharing a harvester with a neighbour
- financial costs of delays to the harvest, eg. fire risk, weather damage and grain quality downgrades

- intelligence you can gather about weed problems by operating the harvester
- skills you have in maintaining and repairing harvesters
- cost of new versus second-hand harvesters
- size of your future cropping program and seasonal conditions
- opportunity cost of using capital that could be allocated elsewhere.

Costs of owning a harvester

Owning a harvester typically incurs large fixed costs. Although a harvester is often only used for two months of the year, up to 90% of its cost can be fixed in the form of depreciation, finance/opportunity cost of capital and insurance. Operation and maintenance costs are minor in comparison. In general, the size of the cropping program will often dictate the required size of the harvester and therefore the magnitude of the overhead (fixed) costs.

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Estimates of the annual cost of owning harvesters valued at \$500,000 or \$300,000 are given in Figure 1 below. There is provision for repair and maintenance costs for the harvester valued at \$500,000 but if the harvester is new, some repair costs may be covered under warranty.

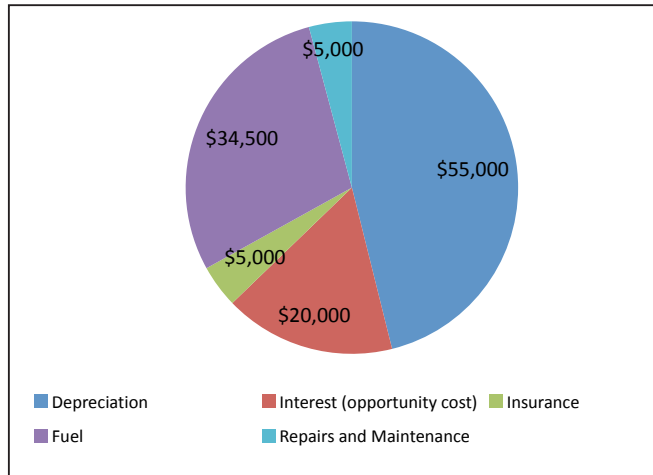


Figure 1a **Estimated annual cost breakdown of owning a harvester valued at \$500,000 (assumes 2000ha crop)**



Figure 1b **Estimated annual cost breakdown of owning a harvester valued at \$300,000 (assumes 2000ha crop)**

The cost structure of ownership varies with the age of the equipment as demonstrated in the following example.

Example 1: A \$500,000 new harvester will cost the farm enterprise at least \$80,000 pa in fixed costs of depreciation, opportunity cost capital (at 4%) and insurance. Repairs and maintenance will mostly be covered by warranty and the fuel cost is variable and negligible by comparison. Alternatively, buying a used (second hand) harvester valued at \$300,000 will cost around \$50,000 pa in fixed costs. After allowing for an additional \$5,000-15,000 pa of maintenance costs due to owning an older harvester, the savings in fixed costs outweigh the additional maintenance

cost and, in this instance, translate to a \$15,000-25,000 pa saving to the farm enterprise.

Harvest Option Analysis

To understand how the cost of harvest options varies across crop acreage we have analysed a number of scenarios as outlined below. We have incorporated additional crop insurance into options where the farm enterprise is exposed to more weather risk due to harvest delays. Costs are calculated on an annual basis. The options are:

1. Buy a new harvester for \$500,000 including 4% real interest charge for the opportunity cost of capital
2. Hire purchase lease for a new harvester valued at \$500,000 at 12% pa over a 5 year term with nil residual
3. Employ contractors—the cost in WA varies between \$37-50/ha (excluding fuel) depending on cropping conditions and includes chaser bin. We assume \$42/hr and include 33% crop insurance to allow for potential delays in harvest
4. Rent a harvester valued at \$500,000 on hourly rate charged at 0.1% RRP and include 33% crop insurance for potential delays in harvest
5. Buy a second hand harvester at 60% of new price (\$300,000)
6. Share a new harvester with a neighbour on a 50/50 basis, and include 100% crop insurance
7. Own a second-hand harvester, and contract harvest 30% of the crop area

Based on our assumptions our analysis (results overleaf) suggests the annual cost of contract harvesting is the lowest annual cost option for cropping programs less than 1,500ha. For crop areas greater than 1,500ha the cost of owning a harvester valued at \$300,000 is the lowest cost option and varies from \$50/ha for 1,500ha to \$12/ha for 10,000ha.

This is not prescriptive and should be viewed as a guide only. There is also the option of smaller operators purchasing older second-hand harvesters which is not included in our analysis. Furthermore, other factors need to be taken into consideration including risk of crop damage, price spreads for grain quality, and yield, which can be influenced by contractor efficiency. We have explored the potential financial impact of these factors in Table 1.

Table 1 illustrates the financial impact in \$/ha of i) a contractor that may be more or less efficient than the farmer and ii) a downgrade in crop quality leading to a reduced price per tonne. We assume the crop yield is two tonnes per hectare and the base case price of wheat is \$230 per tonne.

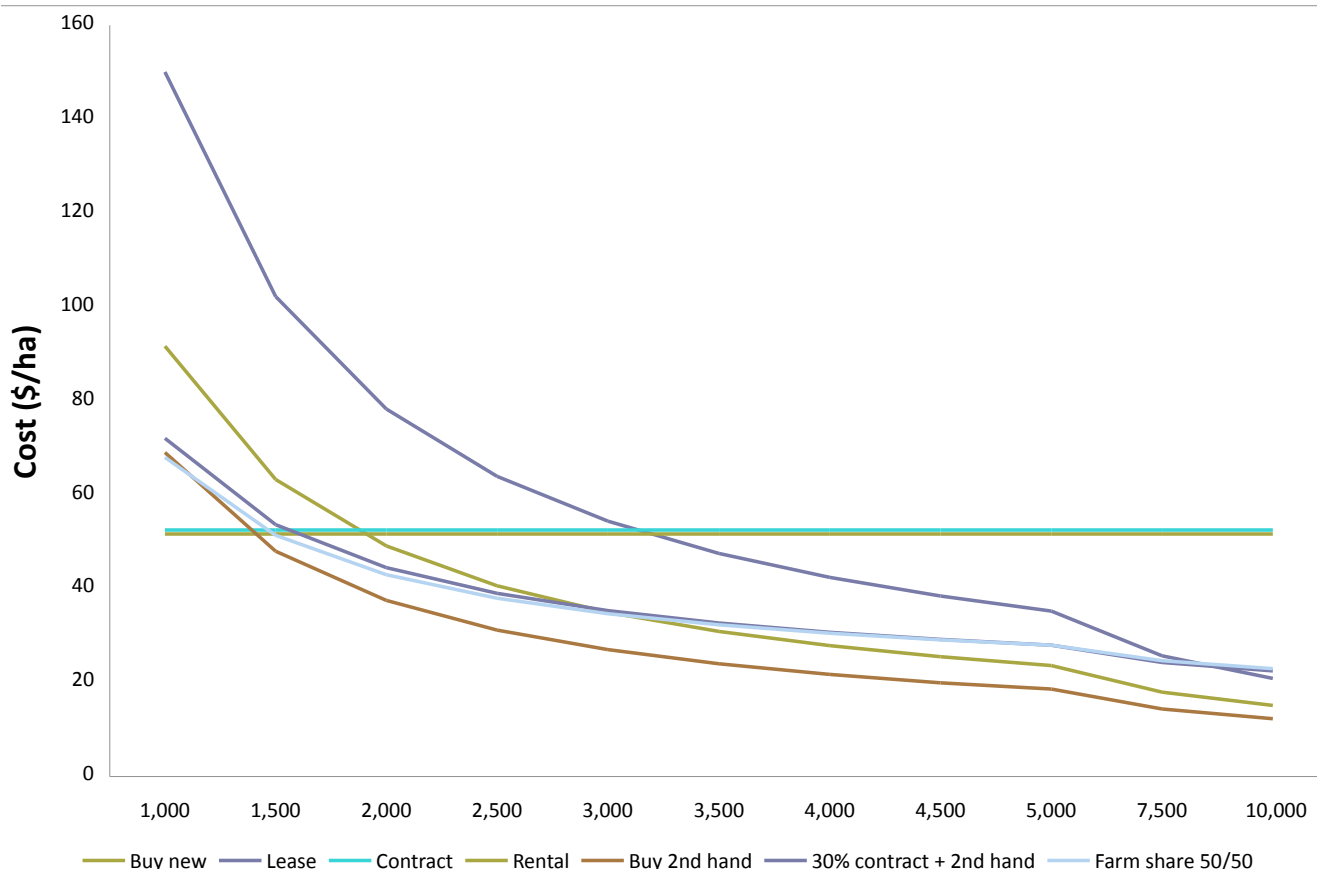


Figure 2 Cost of various harvest options \$/ha, (assumes 2t/ha yield)

Table 1 Price matrix showing the \$/ha cost of i) a price downgrade and ii) cost (gain) of contractor yielding less (more) than the farmer would have (\$/ha) assuming 2t/ha yield						
Discount due to quality downgrade \$/t	Contract harvest yield as % farmer harvest yield**					
	105%	102%	100%	98%	95%	90%
0	-23	-9	0	9	23	46
-10	-2	11	20	29	42	64
-25	30	42	50	58	71	91
-50	82	93	100	107	118	136
-75	135	144	150	156	166	181
-100	187	195	200	205	213	226

**Assumes base yield is 2t/ha and base price of wheat is \$230/t

Our analysis shows that if a contractor operates at 95% efficiency (i.e. losing 5% of the potential grain yield during harvest), it costs the farmer an additional \$23/ha. This effectively increases the contracting cost to around \$68/ha. Alternatively, if the contractor is 5% more efficient in taking off the crop (e.g., due to newer equipment), it could translate into a \$23/ha saving, effectively lowering the contracting cost to \$22/ha.

The cost of a downgrade to quality can be significant and depends on the extent of the

downgrade margin which can be large in some seasons. In season 2011, for example, downgrades from milling wheat to general purpose cost between \$20-40/tonne depending on what variety was grown, whereas the downgrade to feed typically cost \$80/tonne in 2011.

The cost of a quality downgrade is shown in Table 1. If, for example, a weather event causes the crop to be downgraded by \$50/tonne, then based on a 2t/ha yield this translates to a cost of \$100/ha, which is more than double the cost of employing a contractor. In this instance, the farmer would have been \$50/ha better off had they also employed contractors in the early part of harvest and avoided the impact of the weather event.

Conclusion

Purchasing a new harvester is not the only way to invest in harvesting capacity. Other options are available, although each has its particular advantages and costs. The investment in a new harvester is significant and can cost up to \$80,000 pa in fixed costs (based on \$500,000 harvester).

By comparison, operating costs are relatively minor. For a range of cropping programs we evaluated various harvest options including buying a new or used harvester, using contractors, and leasing or renting a harvester. In our analysis, which considered new harvesters worth \$500,000 or \$300,000 as second-hand, contracting was

more cost effective than owning, for cropping areas less than 1,500ha. For areas greater than 1,500ha, owning a harvester was more cost effective. Also, in situations with high weather risk and associated crop damage, using contractors to complement the farmer's own harvest gear was likely to be worthwhile. With the high cost of depreciation and opportunity cost of capital we often found that purchasing a second-hand harvester rather than a new one was more cost effective.

Our findings should be used as a guide only, as in practice deals on offer need case-by-case appraisal. However, listing the factors relevant to the purchase decision is useful. These factors include the annual cost of the option, its harvest efficiency and impact on yield; the farm's weather risk and financial exposure to grain quality downgrade; adequacy of on-farm storage and the risk of disruptions or delays transporting grain from farm to bin or port. We found profits from harvest were very sensitive to a downgrade in crop quality, particularly with price spreads widening in seasons with high yields. For instance, a \$30/t discount due to a downgrade from APW to general purpose translates to a \$60/ha cost on a crop yielding 2t/ha. This is significantly higher than the \$38-50/ha it costs to employ contract harvesters and in this example a farmer would have been at least \$10/ha better off had contractors been able to be used early enough to avoid the impact the weather event.

The ability of contractors or newer equipment to be more efficient and harvest higher yields should also be considered. For example, if a contractor is 2% more (or less) efficient harvesting a potential

2t/ha crop, then the farmer will save (or lose) \$9/ha assuming the cost of APW is \$230/tonne.

Another issue at harvest is the consequence of bottlenecks in the supply chain, particularly in seasons with above average yields. When regional grain production is very large, contractor harvesters, rental equipment and transport trucks can be in short supply and the turnaround time at the grain bins is often significantly longer. If it appears the season will result in delays in turnaround time and there is a risk of an adverse weather event and possible downgrade, we recommend farmers consider investing in additional on-farm storage. Similar to the supplementary contracting scenario, a downgrade in quality can cost a lot more than the investment in additional storage such as silos, sausage bags or sheds.

In summary, when considering harvest options, farmers should not only consider the capital cost of the equipment but also consider their seasons, the risk of delays and downgrades and assess the overall financial impact of each harvest option. In general, be aware of the often high fixed costs of buying a new harvester, match it with the ability of the farm enterprise to absorb this overhead and also consider the opportunity cost of alternative uses of the capital. Also, assess the risk of a weather events leading to a downgrade. If the risk is high, and if spreads are high and/or volatile, we highly recommend farmers consider using contractors or hiring equipment in early harvest to supplement an owned harvester with a view to harvest the crop as fast as possible.



Lupin harvest



Barley harvest