The cost of chasing harvest efficiency

Photo: Kondinin Group

Stripping crops in the most efficient and time-effective way is one of the main goals at harvest. Chaser bins have a role to play in achieving this goal and a simple calculation can help growers determine whether the costs of operating a chaser bin are outweighed by the benefits.

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Do the maths: *The cost of owning and operating a chaser bin can be compared with the value of the extra grain that can be harvested each hour, because the harvester does not need to stop to empty the grain bin.*

At a glance

- Chaser-bin use has the potential to increase harvest efficiency by 35 per cent.
- The cost of running a chaser bin can be viewed as insurance on the extra grain harvested.
- There are many things, not just the cost, to consider when determining the viability of a chaser bin.
- A basic calculation will prompt or dismiss further investigation into the viability of owning and using a chaser bin to increase harvest efficiency.

Photo: Beth Field

During harvest, timeliness can mean the difference between profit and loss.

Some basic calculations reveal that stopping a harvester to unload the grain bin can potentially reduce harvest efficiency by 35 per cent, in effect meaning harvest takes 35% longer than it needs to.

A common way to negate the lost time to stop and empty is to run a chaser bin, but that comes at a cost.

The big question is how much does a chaser-bin cost in comparison to what it can potentially save?

The effective cost

Calculating the financial return on a chaser bin is difficult because the cost of timeliness is never known until a disaster strikes and the crop is damaged.

But if viewed in the same way as insurance, a chaser bin can enable more grain to be harvested, removing the risk of weather damage to the extra portion of grain.

The cost of owning and operating a chaser bin can be compared to the value of the extra grain that can be harvested each hour, because the harvester does not need to stop to empty the grain bin.

The calculation explained

A theoretical example shows the calculation is really quite simple using the core influencing factors and assuming potentially damaging weather is looming.

Step 1 – Consider a harvester with a work rate of 40 tonnes per hour, a grain bin that can hold 9.5t and the harvester spends five minutes out of the crop each time the bin needs to be emptied. This means the harvester is spending 35% of the time out of the crop.

Step 2 – In this example the true harvester work rate is therefore reduced by 35% because it is only in the crop for 65% of the time.

Multiplied by the value of the grain being harvested ($200/t) and the percentage reduction in value of that grain after it is weather damaged (40%), the potential loss is therefore $1123/hour.

Of course there are events that would damage the crop completely, such as hail or fire, making the reduction in value of that grain 100%. In this case the loss would be $2800 for each hour spent harvesting due to the inefficiency from stopping to empty.

But typically, weather-damaged grain is downgraded in value by about 40%.

Therefore, running a chaser bin would enable an extra $1123 worth of grain to be harvested during each hour of harvester operation.

Step 3 – The cost of running the chaser bin is simply the tractor running costs plus the chaser-bin running costs plus the cost of a driver to operate it.

In this example the tractor running costs are estimated at $60 per hour including fuel, depreciation and an allowance for repairs and maintenance.

The cost of the chaser bin has been simplified to just the depreciation rate per hour, based on the purchase price, minus the salvage value divided by its total working life, which results in an hourly rate.

Allowing for the depreciation on a brand new chaser bin, but not allowing for the interest on the purchase, the running cost amounts to $41/hr.

The total combined cost of running a chaser bin in this example is $126/hr.

Step 4 – The cost of running the chaser bin at $126/hr compared to the value of the potential loss at $1123/hr is equal to 11.3%.

The result is that it is costing 11.3% to ensure the extra $1123 worth of grain is harvested each hour.

Insurance comparison

To help decide whether the cost is 'good value', in this example 11.3%, it can be compared with taking out crop insurance, which typically costs 5–10% of total crop value.

Running a chaser bin cannot take the place of crop insurance, because it only insures the extra grain harvested not the entire crop, making it an additional insurance cost.

But to the contrary, crop insurance only covers against fire and hail damage and typically takes effect in value intervals after a certain percentage of the total crop is destroyed.

Likelihood of damage and loss

When considering the cost of running a chaser bin as effective insurance, the likelihood of a weather event damaging the crop also needs to be taken into account.

In the northern parts of Australia where rainfall is summer dominant, weather damage to winter crops at harvest is more common.

In the southern growing regions with winter dominant rainfall, inclement harvest weather is less common.

Additional considerations

There are many more factors to consider before purchasing a chaser bin.

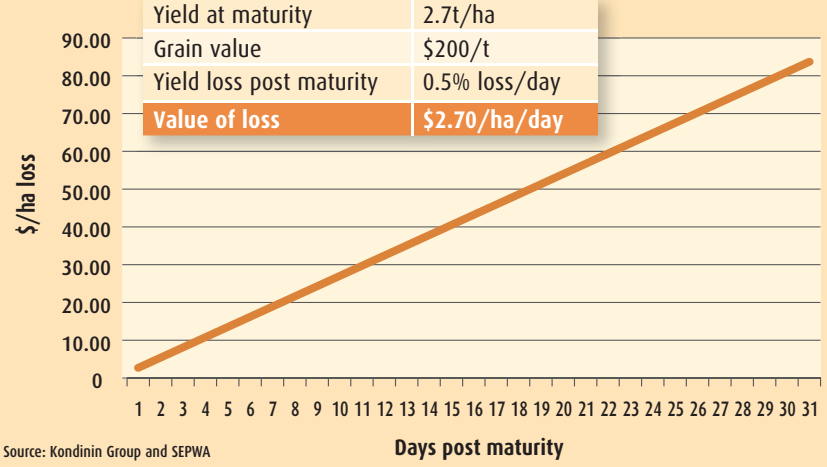
- Cash flow for the capital outlay and interest.
- Purchasing a second-hand chaser bin may be a cheaper option to trial.
- Consider the option of hiring a chaser bin, with or without tractor and driver.
- Availability of labour (not just the cost).
- Availability of a spare tractor at harvest.
- Likelihood of crop loss due to weather damage and the likely percentage of damage.
- Crop insurance costs, what it covers and when it takes effect.
- Paddock size and harvesting direction.
- Size of chaser bin suitable to the operation balanced with the need for field bins and mother bins.
- Other limiting efficiency factors such as trucks being able to keep up with the harvester work rate.
- Yield loss on grain harvested after the ideal time.

Research carried out by South East Premium Wheat Growers Association (SEPWA) in Esperance Western Australia, has shown a cereal crop can lose 0.18–0.75% of yield, for every day it stands in the field post maturity.

Unlike the potential loss from weather damage, which is variable, yield decrease on over-ripe crops is a known value (within the variations of the research done).

FIGURE 1 Value of loss from harvesting post maturity

Yield at maturity	2.7t/ha
Grain value	$200/t
Yield loss post maturity	0.5% loss/day
Value of loss	**$2.70/ha/day**



Source: Kondinin Group and SEPWA

Assuming a yield of 2.7t/ha at maturity, a grain value of $200/t and a yield loss of 0.5% for every day grain is not harvested post maturity, the loss would be $2.7/ha/day (see Figure 1). The yield loss of over-mature crops is not considered in this calculation.

Making the decision

Deciding if the cost of running a chaser bin, 11.3% in the example given, is warranted needs to be considered on an individual-grower basis.

There is no rule to determine insurance is good value — it depends on the amount of risk the grower is comfortable with and any other associated considerations.

Use this calculation as a guide to prompt or dismiss further investigation into the viability of running a chaser bin to increase harvest efficiency.

Online calculator

An excel-based calculator, available at www.farmingahead.com.au, allows growers to input their own variables to calculate a more attuned cost of running a chaser bin in their own operation.

The calculator is an easy way of running through the basic calculation shown in this article however it does not take into account the entire range of variables and other possible considerations.

Step 1. Harvest efficiency loss:

In-crop work rate (40t/hr) X time out of crop to unload (5mins)
/
Harvester bin capacity (9.5t X 0.6)

= Percentage harvest time lost due to unloading time (35%)

Step 2. Value of potential loss:

Work rate (40t/hr) X harvest time lost (35%) X grain value ($200/t) X reduction in grain value after weather damage (40%)

= Potential loss ($1123/hr)

Step 3. Chaser bin cost:

Tractor running cost ($60/hr) + chaser bin cost ($41/hr) + driver cost ($25/hr)

= Cost to run a chaser bin ($126/hr)

Additional workings:

Fuel (20L/hr @ $1.50/L = $30) + depreciation ($20) + repairs and maintenance ($10)

= Tractor running cost ($60/hr)

New value ($85,000) – salvage value ($30,000)
/
Working life (10yrs) X total hours used per year (133)*

= Chaser bin cost ($41/hr)

*Total hours used (2000ha/15ha/hr ie 2.7t/ha@40t/hr)

Step 4. Percentage cost of securing extra grain (such as insurance for extra grain harvested):

Cost to run chaser bin ($126/hr) X 100
/
Potential loss ($1123/hr)

= Percentage cost of extra grain harvested (11.3%)

Photo: Beth Field

Harvest while the sun shines: *Stopping the harvester to empty significantly reduces harvest efficiency.*

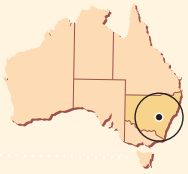
Chaser bins offers multiple benefits

Case study

Farm information

Farmer
Edwin Nash

Location
Parkes,
New South Wales



Annual rainfall
530mm

Enterprises
Crop — 1000ha of crop,
Merino ewes — 1200

Mixed farmer Edwin Nash knows well the many benefits of running a chaser bin, including harvest efficiency increases of about 20 per cent.

Edwin operates a Case IH 2388 harvester and estimates he comfortably harvests 30 tonnes per hour with the help of a chaser bin.

Edwin says his harvest efficiency, achieving 30t/hr or better, depends heavily on a number of factors including harvester set-up, paddock layout and the logistics of trucks.

Reducing compaction

Edwin says improved efficiencies are just one of the benefits of operating a chaser bin.

Operating on a controlled traffic system, the chaser bin follows tramlines along the paddock and moves two wheels off those lines only while filling.

This means the harvester or trucks are not 'doing laps' of the paddock and as a result adding to the compaction.

Reducing fire risk

Harvesting in an up-and-back configuration, Edwin often has roads at each headland for trucks, fire carts and other machinery to drive on.

This means the only machines in the paddock are the harvester and the chaser bin, so the risk of fire is reduced.

Precision for safety

The risk of equipment damage and accidents is also lessened with the use of a chaser bin according to Edwin.

"Without a chaser bin, when the header has to leave the crop to empty, operators try to rush, which can be dangerous while driving close to trucks and field bins."

"Wider fronts and longer augers have made manoeuvering such equipment dangerous if care is not taken."

Edwin suggests a safer option is to have both the harvester and the chaser bin on GPS auto-steer so they drive parallel, at a steady pace.

Key feature

Edwin owns a 15t chaser bin made by Agfab in Goondiwindi and says the number one feature he will be considering when purchasing his next chaser bin will be ease of cleaning. FA

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Photo: Beth Field