

Harvesting short, patchy crops

Poor, dry seasons can cause crops (cereals, lupins and canola) to be patchy and short. Harvesting these crops will be a challenge, so machinery settings need to be adjusted, or header fronts modified, to effectively cut and convey a high proportion of heads (or pods) from the cutter bar into the harvester to reduce grain losses.

The Department of Primary Industries and Regional Development (DPIRD) provides this information to help Western Australian farmers in dry seasons.

Short and patchy crops and erosion

Stubble ground cover after harvesting short and patchy crops may be inadequate to prevent wind or water erosion in the following summer and autumn.

On these stubbles, we recommend no or very restricted grazing by livestock, minimal vehicle movement across the paddock and protect soil surfaces in gateways and bare patches. See [Managing wind erosion in southern Western Australia](#) for more information.

How to harvest short and patchy crops

- Adjusting harvester settings or modify the front to improve your harvest efficiency and reduce grain losses, especially for short, patchy and low yielding crops.
- Attach black High-Density Polyethylene (HDPE) or similar to a finger tine reel to sweep material onto the belt or table. Note: modifications to the harvester that is not approved by the manufacturer may void the warranty and insurance. The grower wears the risk.
- Keep knife sections in good repair and adjusted correctly onto the knife guard.
- Catch cut material in conventional open front headers by using extension fingers forward of the knife.
- Use drop trays when harvesting to determine losses from the threshing system and adjust the set up for the drum/rotor, concave clearance, sieve and wind settings.
- Use the information and grower tips below.

Harvesting patchy canola

If canola is thin and patchy, the plants out on their own can grow very big with thick stems and this can cause uneven ripening as well as knife blockages.



Figure 1. Patchy canola crop

To even up ripening, desiccate the crop with diquat. It is recommended to do this when 70-80% of randomly selected pods have seeds that have started to change colour. A dark spot on an otherwise green seed is considered colour changed.

If weeds are a major problem in a patchy canola crop, then a pre-harvest spray of a registered glyphosate product may be better than using diquat. This option can be done earlier, from 20% colour change (Figure 2). We have no evidence of yield or oil reduction at the 20% colour stage. Glyphosate doesn't kill the canola as fast as diquat but being earlier may stop weed seed-set. Canola with 100 per cent seed colour change is too late for desiccation or swathing (Figure 3).



Figure 2. Canola pod with seeds at 20% colour change



Figure 3. Canola pod with seeds at 100% colour change.

Swathing can even up ripening, but if the crop is patchy, it may be more difficult to pick up the swath. In general swathing is more economic when potential yield is over 1.5t/ha and where weather conditions at harvest can be a problem.

Thick-stemmed canola can cause knife blockages. A three finger (34mm gap) knife guard should have no problem, including stub guards (Figure 4). Be aware that sub guards can cause wrapping. Two finger (57mm gap) guards should not be a problem.

Some conventional header fronts allow the knife to be pushed further forward on-the-go, which allows for big plants to fall back in, then can be pulled back for smaller plants (Figure 4). Retractable fingers all the way along the table auger also helps feeding in big crops.



Figure 4. Claas Vario front with on-the-go knife extension

Losses of grain are losses of \$s

Harvest losses occur in good and poor seasons, but the proportional value of losses in poor seasons is much higher. Also, this year's grain losses are next year's weeds!

In a good year

In 2003, a survey of 41 paddocks within 50 kilometres (km) of Merredin found that wheat harvest losses averaged 61 kilograms per hectare (kg/ha) in a 2.3 tonne per hectare (t/ha) crop (2.7% loss), with 90% of lost grain still in heads on the ground. Assuming wheat at \$350/t, 61kg/ha equates to \$21.35/ha or an overall loss of about \$73 000 for a 4 000ha cropping program. This probably resulted in reduced profit.

In a poor year

In the poor 2002 season at Merredin, harvest losses were higher in the short crops. For wheat, the harvest loss was 70kg/ha in one paddock for a 0.6t/ha harvested crop (10% loss). For lupins, the harvest loss was more than the harvested yield, with up to 390kg/ha of grain on the ground in one paddock after the machine harvested just 0.3t/ha (57% loss). This probably resulted in an operating loss.

How much can losses be reduced?

Surprisingly, there is plenty of information on how to reduce losses, and very little information on the reduced amount of losses.

One published reference is “Effect of guard spacing, guard attachments and reel type on chickpea harvesting losses”, by Mark Siemens, ASABE, 2006, DOI:[10.13031/2013.21997](https://doi.org/10.13031/2013.21997)

“Depending on header configuration, front losses accounted for 58% to 99% of total harvesting losses, which ranged from 3% to 20% of total yield. Four finger or double density guards reduced front losses by 54% as compared to two finger or single density guards when used with an air reel.

Reductions in front losses did not occur when double density guards were used with the batted pick-up reel. Averaged across both reel types, long finger guard attachments were found to reduce losses by 44% as compared to guards without the attachment. As compared to the batted pick-up reel, the air reel reduced front and total harvesting losses by more than 54% when used with double density knife guards and guard attachments.

When the front was configured with double density guards, long finger guard attachments and the air reel, front losses were 3% of total yield, while total losses were 4% of total yield and significantly lower than for any other front configuration. As compared to the conventionally equipped front with a batted pick-up reel and single density guards, this front configuration reduced front and total losses by 86% and increased harvester yield by 126 kg/ha.”

Why you need to measure losses

- to know where the losses are occurring,
- to know how much you are losing,
- to know whether the machinery adjustments are making a difference.

Where are you losing grain?

Grain can be lost pre-harvest, due to natural shedding and environmental factors, at the header front, due to front type or set-up; and from the threshing system of the machine, due to incorrect settings for the drum or rotor speed, concave clearance, and wind settings. For short crops,

significant harvest losses can occur at the header front, particularly in dry years, if heads or pods are mechanically dislodged from plants (by knives, cutterbar and reel) before entering the front. The source of grain losses, can be measured (see https://www.gga.org.au/activity/measuring-harvester-losses-in-western-australia/?doing_wp_cron=1789948008.1477630138397216796875).

- Measure machine losses by attaching drop trays to the harvester with magnets (Figure 5).
- Measure front losses by attaching drop trays to the side of the front, and the driver stops before the spreaders add to the losses in the drop tray. See a loss measurement calculator for drop trays at <https://grdc.com.au/resources-and-publications/apps/harvest-loss-calculator>



Figure 5. Example of a drop tray under the harvester rear axle to measure machine losses.

Modifying the harvester front for short crops

Improve separation efficiency and reduce harvest losses by modifying the front of the harvester to cleanly cut, pick up and clear low-cut material from the knives and feed this material evenly into the harvester. These modifications, together with some simple tips from growers from previous seasons, should reduce losses when harvesting short, patchy crops.

The reel

The reel helps feed the cut material into the front of the header and for short crops, one of the easiest modifications a grower did to a finger tine reel is to attach 1.5mm thick black HDPE to sweep the cut material back onto the table or belt (Figure 4). This material is relatively cheap, (available from plastic suppliers) can be cut with tin snips and would cause minimum damage to the header if it comes off. It also allows for worn reel fingers as it can extend down evenly to the knife (Figure 4). Black HDPE reduces reflection from lights at night. Sheets are generally 1.0m x 2.0m. It is important to stagger the HDPE, say on each second section going around the reel, or the eyes tend to follow if they are in sequence, which could lead to driver headaches or fatigue. Placing on every reel section overcomes headaches but tends to block the view of the knife but if the front has height sensing control, it may not be a problem, like the grower's header in Figure 4.

It is important to adjust ground speed, reel speed, pitch and height and where possible positioning to maximise additions to the reel. Some recommend the reel only to be only 5 cm into the crop but this may depend on how uniform the crop height is, particularly with barley as too low can cause the reel to carry heads around the reel and out the front. The tine reel position is lowest just above the knife and the tine angle generally is roughly perpendicular to the table or belt.

An air reel can help blow short material clear of the knife back into the table auger or belt. This also helps with even feeding for maximum separation efficiency. Crary® air reels are available from Harvestaire® for all fronts from 30' (9.1m) up to 60' (18.3m to suit the MacDon D2 fronts) and, being made of aluminium, are relatively light and can be fitted in front of existing tine reels with on-the-go height and wind adjustment (Figure 6). Growers need to be aware of setting the air angle and to be aware of the risks of blowing dirt and rocks onto the belt.



Figure 6. A Crary® air reel attached in front of a belt front with a tine reel

Knife sections

Knife sections need to be in good repair for short crops (taller crops can be rough cut and still feed in ok). You can check if the knife is sharp by feeling the edge with light finger pressure; it should feel prickly. Change the knife sections if the edge feels smooth. Adjust the knife section hold-down clips so the knife cuts on the bottom of the knife guard with no more than 2mm of clearance (Figure 7). This can be particularly important for cutting thin stems. The knife guard edge needs to be sharp. It may need a touch with an angle grinder, or if it is too rounded, replaced.

Read your Operators Manual to ensure you make knife guard adjustments without damaging them. Also, if the wear bar (which may be turned over on some guards) under the knife is worn it will tend to make the knife section ride on the back edge, which will lift the important front cutting tip off the knife guard, as can be seen in Figure 7. Additionally, it can also wear the back edge of the knife guard.

Double density or four finger knife guards reduce sideways movement of plants when cut and therefore shake the plant less than standard two finger knife guards (Figure 8).

Extension fingers

Extension fingers that extend forward from the knife may also help catch cut material on conventional open front headers. Some manufacturers have various finger-gap spacings to suit different crops and various finger angles to suit the make and angle of fronts (Figures 9 and 10).

However, if a lot of turning in-crop is done, extension fingers can push the crop over. Extension fingers are ideally suited to straight runs such as with controlled traffic farming (CTF) systems or cases where only gentle in-crop turns are done. Keep plenty of spare fingers and knife guards on hand in case you hit rocks.

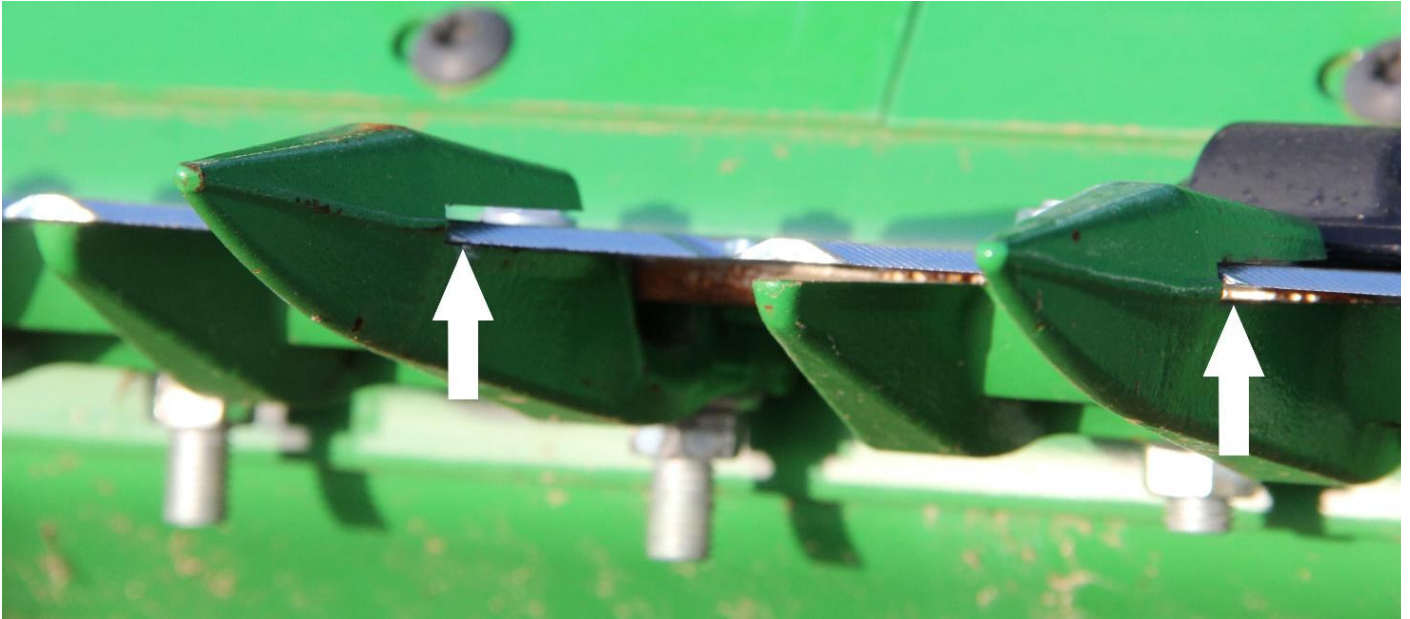


Figure 7. Correct (no gap below the knife section) (left) and incorrect (right) knife position against the knife guard on a new front



Figure 8. Four or double density (left) and 2 or single density knife guards (right)



Figure 9. Straight and angled extension fingers on Primary Sales Australia knife guards



Figure 10. Harvestaire® extension fingers

The relatively inexpensive Vibra-mat®, from Primary Sales Australia, may also be useful on tin fronts for short crops (Figure 11). The table needs just a slight backwards angle and since the normal knife hold-down clips are replaced with a rear hold-down clip, the knife sections and guards need to be adjusted correctly first. The mat may also improve the evenness of feeding into the header which would improve the separation efficiency.



Figure 11. Vibra-mat® fitted to a knife

Short cereal crops may also have small grain in the head tip, which is more difficult to thresh. Concaves and drum or rotor bars need to be in good condition to thresh properly under these low flow conditions.

Threshing patchy crops

A problem for harvesting patchy crops is that the uneven feed of material can cause threshing to be poor and the wind on the cleaning sieves can throw grain out when the

flow is low. One option is to set the harvester for the low flow and accept a dirty sample from lack of wind in the better areas, then clean the seed with a high flow seed cleaner. This system works in patchy canola that has been desiccated with diquat to even up the ripening.

Grower tips

The following tips came out of discussions with growers. They can be grouped under three headings: front, broad elevator and operating tips.

The front

- Before the season, on belt fronts, change the bearings in the rollers under the belts, particularly near the knife, as the chance of soil getting into partly worn bearings is increased when harvesting short crops.
- Crops like lupins may work down towards the knife in the centre which may jam the centre belt on belt fronts. A sheet metal filler plate just behind the knife with a rubber flap on top may help (the flap goes over the centre belt and the ribs on the centre belt flick the rubber flap which keeps the material moving).
- Harvestaire® and Primary Sales sell a 'Paddle Tine' or 'Duck foot' to replace the tines of the Hart Carter, Macdon, John Deere and CLAAS Convio reel tines (type I and II) in a staggered pattern to help sweep material off the knife (Figure 12). In heavier crops they may carry material over the reel.



Figure 12. Paddle tines staggered around a tine reel.

The broad elevator

- A rusty surface can cause poor feeding over the platform and into the broad elevator of a tin front. Prevention is better than cure and applying rust preventative or painting the bare metal right after harvest is advised. Smoothing the rusty surface, especially where it leads into the feeder house and spraying with an ironing aid, such as Fabulon®, will reduce friction. Beware: Fabulon® can make surfaces very slippery to stand on, so only apply just before starting to harvest.
- You can adjust the front barrel of the broad elevator closer to the table auger by adding links and adjusting the broad elevator chain. Some headers have height adjustment, so it can be adjusted downwards as well. Take care not to move the barrel so close that it touches the retractable fingers or paddles.
- On belt fronts, the front barrel may also be lowered but make sure the retractable fingers have 50 mm clearance to the centre belt. The position of the retractable fingers may need adjustment to give this clearance.
- Check the serrated bars on the broad elevator for wear. They help to grip the straw.
- Rubber strips bolted onto every fourth, or fifth bar of the plain type (non-serrated) broad elevator chain also helps to grip the straw.
- A rubber flap hanging over the top part of the opening into the feeder house will prevent material repeating inside the broad elevator being thrown out of the front.
- Replacement broad elevator slats called 'Hi-Tooth Slats' from Harvestaire® may improve feeding on Case IH harvesters.

Operating tips

There is more chance of picking up sticks, roots and stones, which cause damage if the header is not stopped quickly. The 'stall stop', or 'stall test' method may be the quickest way to stop the header, rather than using the clutch.

This method may place stress on machinery, and turbo charged engines must be restarted immediately. Please seek your dealer's advice on the finer details of the stall testing procedure to prevent equipment damage and personal injury.

You may also need to throw out the separator. Pull the throttle back past idle to shut the engine down, flick the separator switch, or lever, move the throttle to idle and restart immediately.

To improve separation in low flow conditions, slowing the rotor or drum speed will help keep bulk in the threshing area. Concave filler plates will also help threshing.

Additional information based on comments from growers and other sources

- One grower used old draper belting on the tine reel. Be conscious of weight on reel and if it comes off that it does not go into the feeder house.
- Another said to put a bit of white paint on the draper belt so you can see it moving as low flow can make it hard to tell if the belt is moving - it could be jammed.
- Having a sharp knife also reduces stress on the knife drive wobble box.
- Have a shovel handy for cleaning sand off the front.
- Paddle tines were used successfully in the centre section of a front where build up was a problem.
- One very experienced grower suggested raised knife kits on belt fronts are a problem for harvesting close to the ground. The underneath section tends to bulldoze more than with the knife in the normal position since the rounded section is now further from the knife guards (Figure 13). He also said an air reel was the best as it doesn't pull rocks in and is lower maintenance than a tine reel and keeping the belt angle at 37 degrees on Case IH fronts (the end skids parallel to the ground) helps keep the knife at the correct angle.



Figure 13. Raised knife guards on a Case 1040 belt front

More Information

Please be aware that any modification to the harvester, which is not approved by the manufacturer, may void the warranty and insurance. The risk is worn by the grower.

For further information or any tips growers would like to share, please contact Glen Riethmuller in Merredin on 0417 975 360, email: glen.riethmuller@dpird.wa.gov.au.

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