

harvest management

in stubble retained systems in Central West NSW

Project code CWF00018

KEY MESSAGES

- Stubble management begins at harvest.
- Consider the implications of using a header to cut stubble to lower heights. At a stubble height of 25 centimetres a modern header operates at about 85 per cent efficiency. In heavy crops it may be more economical to manage stubble post-harvest.
- A harvest agreement should be negotiated between growers and contractors well before harvest commences. Owner operators can be more flexible with regard to cutting stubble to lower heights (if needed) than those who hire contractors.
- Windrowing can be a valuable tool for weed control, but may increase harvest time and costs.
- Paddock mapping at harvest can indicate areas of weed resistance and nutrient deficiencies.



Overview

In Central West NSW the benefits of retaining stubble include better infiltration of rain and protection of cropping country from erosion.

A 2013-2014 CWFS harvest height trial at Weethalle concluded that stubble height did not influence fallow efficiency in dry seasons, but CWFS stubble trials at Wyalong in 2013 showed plots with taller stubble required spraying for weeds prior to plots

with shorter stubbles. Effectively this resulted in an extra spray during the fallow in a dry summer.

Weed Control at harvest

Low cutting harvest weed management practices such as narrow windrows, chaff carts and the Integrated Harrington Seed Destructor (iHSD) can negatively influence both timeliness and cost of harvest (Table 1).

TABLE 1 Harvesting wheat in 2014 at Streatham, Victoria, at three harvest heights (engine load = 90%) using a Case IH 9120 header and cost analysis determined at contract rates of \$400/h.

Stubble height	Average speed (km/h)	Percentage difference (km/h)	Time to harvest 100ha (hours)	Harvest costs (\$/100ha)	Fuel cost (\$/100ha)	Cost (\$/ha)
50cm	7.05	15cm vs 50cm = 38.3%	8.3	3305	789	\$41
30cm	5.45	30cm vs 50cm = 22.7%	10.7	4264	1040	\$53
15cm	4.35	15cm vs 30cm = 20.2%	13.3	5332	1272	\$66

SOURCE: SOUTHERN FARMING SYSTEMS

TABLE 2 A Case IH 9120 harvesting wheat conventionally at 30cm, 15cm for baling or narrow windrow burning, or at 15cm with prototype iHSD in Furrer, SA, in 2016.

Harvest height	Grain yield (t/ha)	Speed (km/h)	Engine load (%)	Fuel (L/ha)	Fuel efficiency (L/h)
30cm	4.7	3.8	59.8	14.3	52.7
15cm	4.6	4.0	65.5	16.4	59.5
% change 30 to 15cm	ns	ns	+9%	+11%	+11%
15cm + iHSD	4.6	4.0	88.7	22.7	87.8
% change from 30 to 15cm + iHSD	ns	ns	+37%	+37%	+40%

SOURCE: MACKILLOP FARM MANAGEMENT GROUP

Economies of stubble height

There have been similar trials in harvester costs between harvesting up to 60cm using a stripper front down to 15cm using a JD9770 in 2014. These trials showed fuel use increased by 78 per cent in the 15cm height, with an overall increase of costs by 57 per cent. (Southern Farming Systems, Mackillop Farm Management group, Southern Farming Systems, Riverine Plains, FarmLink Research 2014).

According to data supplied by Custom Harvesting Australia, harvester efficiency at 25cm in an average height crop is around 85 per cent, to cut stubble low for baling reduces the efficiency to around 55 per cent (see case study 1).

However as harvesters become more efficient these variations may be significantly reduced in the future. New semi-dwarf cultivars of cereals being produced will also simplify harvest strategies.

Where header trash is spread back across the paddock, producers should aim for as even a redistribution as possible. This makes future operations, particularly sowing, easier as well as providing more even retention of soil moisture.

Harvest agreement framework

The amount of stubble to be retained varies with crop types, making it advisable for growers using contract harvesters to negotiate an agreement prior to harvest.

This can be adapted if conditions change and allows the harvest to go ahead without unexpected cost increases for the grower or loss of time and income for the contractor.

When arranging harvest terms with contractors the following points should be considered in the initial agreement and reviewed when the contractor arrives on the property.

- Crop types and yields and how stubble is to be managed for each type
- The height of stubble that the grower's sowing machinery will effectively handle in the following season
- Whether the contractor has allowed enough time to incorporate the grower's stubble management plans e.g. preferred stubble height
- Is the contractor's equipment suited to stubble management techniques such as narrow windrowing, future baling of straw or does he have suitable spreaders for even distribution of chaff?
- Is the contractor equipped to record paddock and yield mapping?
- Are the paddocks in continual crop rotation or are they going into a pasture phase?
- Is the crop going to yield 2 tonnes a hectare? If so, is post-harvest stubble management a better option?

Other points to consider:

- Weather conditions forecast for harvest
- Market conditions e.g. current value of crop
- Sample purity – setting and operating the header to receive standards
- The condition of the crop – is it free standing or lodged, are there weed affected areas?
- Total crop area
- Paddock terrain – ground conditions and obstacles
- Proximity to trucks and field bins

- Provision of other equipment by contractor e.g. augers, trucks, field bins
- Travel distance to farm
- Accommodation and living away from home expenses for contractor and staff
- Contractor's operating costs, both fixed and variable plus profit margin
- Grower's operating costs, both fixed and variable plus profit margin

Written agreements are available from Australian Custom Harvesters (ACH) based on hourly rates, an amount per hectare, or on a per tonne basis.

A formal agreement is of benefit to both parties. Where the same contractor is employed continually, any change in operation should be acknowledged by both parties before harvest.

Operating costs for modern headers are over \$600 an hour.

A link to Australian Custom Harvesters.



<http://www.customharvesters.org.au/>
 Email: enquiry@customharvesters.org.au
 Phone: 0447 778 070

Case study 1

Grower: Bob Wythes

Location: Forbes, NSW

Enterprises: Cropping and prime lambs, Australian Custom Harvesters.

Soil and pH: River flats running to heavy clays, pH 7.

Property size: 22,000ha.

Overview:

Bob is currently chairman of Australian Custom Harvesters (formerly Australian Grain Harvesters), an umbrella organisation for contract harvesters in NSW, Queensland, South Australia and Victoria.

He crops around 100ha of lucerne for hay, 200ha of wheat and barley and runs 1000 breeder ewes in a prime lamb enterprise on 500ha of irrigation country just south of Forbes, NSW.

He has recently dropped canola from his cropping rotation due to contract harvesting commitments, as he found it too difficult to juggle demands of his clients with an early maturing crop.

Bob originally used harrows to break down stubble residue for continuous cropping. In 1996 he started using disc chains after harvest to enable sowing with a combine, although he now uses both a disc air seeder and tined air seeder.

Harvest stubble management:

Most of Bob's clients ask for a stubble cut height of 25 cm at harvest. Header efficiency is around 85 per cent at this height although taller crops can cost growers more.

Bob has to negotiate costs with growers, who want straw cut low for baling, as header efficiency drops to about 55 per cent.

In heavier crops yielding more than 2t/ha it is usually more economical to manage stubble post-harvest.

Options for this can include baling (for the mushroom market, although stubble is not retained), slashing, grazing or chaining.

Some growers request the spreaders be removed for windrowing (requiring a shorter cut). Bob has observed that when windrows are burnt during a wet summer they tend to smoulder, potentially creating environmental problems of smoke haze.

While Bob has used choppers where required in the past, he finds spreaders do as good a job and are more suited to 12-metre tramlines in controlled traffic farming.

Paddock mapping:

Bob offers paddock mapping, but finds many growers are not willing to pay for the service, he believes that in some cases growers don't know how to correctly interpret and collate the data over a long period of time.

However, agronomists are helping bridge the gap by educating growers and finding cost savings in variable rate sowing.

Another area that is largely ignored is the ability to observe areas of weed resistance from paddock mapping data. In the affected areas the crop yield usually declines and the weeds are visible from the header, but the grower is not aware of the problem or where it exists in the paddock.

Weeds:

By using disc chains, Bob has also been able to control problem weeds such as fleabane. He says using a mechanical weed control method in conjunction with chemicals offers the best control and minimises resistance.

Relationship with clients:

Bob says one of the biggest issues for harvest contractors is over-commitment. This affects the quality of their work and limits their ability to cooperate with growers to manage stubbles at harvest.

He says if contractors focused on smaller areas rather than travelling as far as possible, the same amount of work could be done with better results for growers.

Listen to a podcast of Bob's case study or follow link below.



<http://cwfs.org.au/podcast/contract-harvesting/>

Case study 2

Grower: Geoff McCallum

Location: Northparkes Mine, Parkes, NSW

Enterprises: 4000ha cropping on controlled traffic system; 1000ha legumes for brown manuring; 1000ha canola; 2000ha wheat and barley.

Harvest stubble management:

Geoff farms dryland country in the Parkes and Forbes districts. At harvest he always cuts the stubble to around 25cm or less to facilitate easy passage of stubble through his sowing equipment.

He used Kirby spreaders for many years and says they did an excellent job in evenly distributing chaff behind the headers. Today's headers aren't as efficient and need modifying.

Geoff asks his contractor to harvest as low as possible. While this can increase his costs by up to 20 per cent, he believes it's worth it to set up the paddocks for the following season.

Prior to the 2015 season stubble loads were as high as 5t/ha, prompting Geoff to burn some to assist with the following year's crop planting.

Other points:

Paddock/yield mapping is supplied by Geoff's contractors.

Geoff is diligent in eradicating bindweed in the stubble as it can cause blockages at sowing. He sometimes cuts as low as possible if ryegrass is present.

He uses the same harvest contractors each year and has a good working relationship with them. The contractors fit in with his controlled farming system and

take great care with biosecurity, ensuring no new weeds are introduced on the headers.

Listen to a podcast of Geoff's case study or follow link below.



<http://cwfs.org.au/podcast/geoff-harvest-management/>

Case study 3

Share farmer and contractor: Darren Miles

Location: Condobolin, NSW

Enterprises: Share farming, contract harvesting.

Overview:

Darren leases and share farms approximately 1600ha as well as running a contract farming business at Condobolin and surrounding districts, mainly Grenfell and Cowra. He generally harvests around 3000-4000ha per year.

He farms mostly wheat and canola in rotation after a conventional fallow, depending on whether it is practical to sow canola in any given season.

Darren has been contract harvesting for fifteen years and says the biggest changes have been in the size of machinery and the introduction of new crops into farming systems.

Harvest stubble management:

Darren has noticed a need to cut stubbles shorter after a run of better seasons has created denser stubble loads, though wider row spacings have certainly helped to avoid problems with the following crop at sowing.

He has noticed those in the east of the region with higher stubble loads are using burning as a tool more frequently than those in the west of the region. He feels this is also due to inter-row sowing becoming 'filled up' after two years when stubble is slow to break down.

Paddock Mapping:

Darren provides yield mapping as a service to his clients although so far he has had few requests for the service in the Central West

area. When clients do require yield mapping, Darren processes the information on his own computer and emails the data to them.

Weeds:

Darren has noticed that occasionally when growers graze stubbles they spray too soon after grazing, and some weeds are not being sprayed out in the fallow phase.

Although grazing reduces stubble loads for the following crop, the downside in some cases may be less effective weed control.

Biosecurity is important to Darren and he cleans his header as effectively as possible between each property.

Servicing clients:

Darren finds that harvesting in retained stubble systems becomes a balancing act between cutting stubble low enough to please clients, and making them understand the extra cost and time involved.

He says those concerned about paying more for lower stubble may be better off dealing with the stubble post-harvest, using a disc chain or harrows.

Darren has had just one client using controlled traffic farming, but says other clients are starting to express an interest in this practice.

Listen to a podcast of Darren's case study or follow link below.



<http://cwfs.org.au/podcast/share-farming/>

Case study 4

Grower: James Butt

Location: Condobolin (now Forbes), NSW

Enterprises: Cropping and prime lambs.

Soil and pH: Heavy red loam through to lighter sandy red loams.

Property size: 4500ha.

Overview:

James farms dryland country north of Condobolin and has concentrated mainly on cropping in the past, but is currently building lamb numbers to diversify.

Currently the program is 80 per cent cropping and 20 per cent prime lambs.

After a pasture phase the first crop in the rotation is usually wheat, followed by wheat, barley and lupins in the final phase, depending on the season and markets.

James uses an air seeder with auto steer, 30cm spacing and knife points (to provide some tilth under the seed) so stubble load is rarely a problem during the subsequent cropping season. If the stubble load is too heavy and looks likely to cause problems it is generally burnt or cultivated.

James prefers to sow across the stubble rows of the previous crop rather than inter-row sow.

Stubble loads in his area are generally not overly dense, so stubble height is usually not an issue at harvest. His main concern is getting the crop off as quickly as possible.

Paddock mapping:

While his contractors have the capacity to provide paddock mapping, it isn't a tool James uses although he is assessing the benefits for the future.

Weeds and disease:

James is keen to avoid any risk of parthenium weed so prefers to use local contractors from Temora who don't work in Queensland. He likes the fact that he doesn't have to wait for contractors to finish crops in the north before starting his own harvest.

Listen to a podcast of James' case study or follow link below-



<http://cwfs.org.au/podcast/harvest-management/>

References

- GRDC, Southern Farming Systems, Mackillop Farm Management Group,
- Southern Farming Systems, Riverine Plains, FarmLink Research, Tony Swan

Acknowledgements

- Bob Wythes, Geoff McCallum, Darren Miles, James Butt. Ian Luelf, Australian Custom Harvesters.

Disclaimer

Any recommendations, suggestions or opinions contained in this publication do not necessarily represent the policy or views of the Central West Farming Systems Inc. (CWFS) or the Grains Research and Development Corporation (GRDC). No person should act on the basis of the contents of this publication without first obtaining specific, independent professional advice. CWFS, GRDC and contributors to these guidelines may identify products by proprietary or trade names to help readers identify particular types of products. We do not endorse or recommend the products of any manufacturer referred to. Other products may perform as well as or better than those referred to specifically. CWFS and GRDC will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

This guideline has been developed by Central West Farming Systems Inc. (CWFS) as part of the Maintaining Profitable Farming Systems with Retained Stubble initiative, funded by the Grains Research and Development Corporation (GRDC). The initiative involves farming systems groups in Victoria, South Australia, southern and central New South Wales and Tasmania collaborating to validate current research at a local level and address issues for growers that impact the profitability of cropping systems with stubble; including pests, diseases, weeds, nutrition and the physical aspects of sowing and establishing crops in heavy residues.

During 2012 discussions with local producers resulted in CWFS identifying 13 subjects that impact on the management decisions for producers in Central West NSW.

Since then CWFS has undertaken a range of research, development and extension (RD&E) activities focusing on these subjects. These publications are an attempt to capture those activities and provide regionally specific guidelines for producers aiming to retain stubble in Central West NSW.

A primary part of this work has been to correlate existing resources and research from several organisations and CWFS thanks these respective organisations for their work. CWFS and the GRDC also thank the experts who technically reviewed these guidelines.