Upper North Farming Systems

Stubble Management Guidelines

More or Less Stubble?

Key Facts

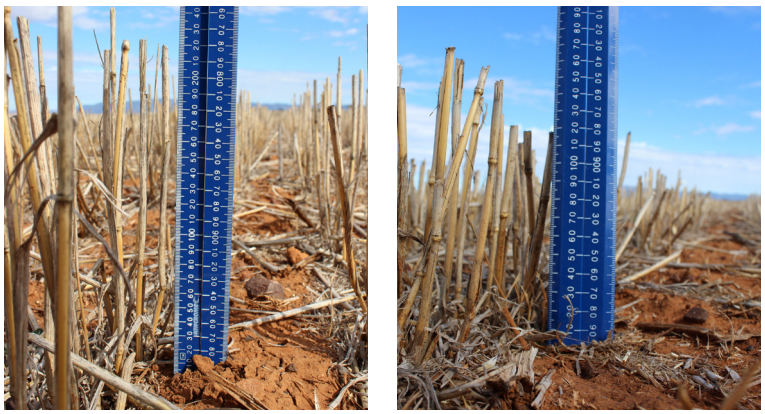
- Depending on growers' circumstances, retaining higher cut stubble may be more profitable than cutting straw to a low height.
- The main benefit of retaining higher stubble is in improved harvesting efficiency.
- The key disadvantage of retaining high stubble is the potential increase in cost of harvest weed control.

While most Upper North growers retain stubble in most seasons, the question now becomes – how much stubble to retain? Growers can choose to harvest high and leave tall standing stubble, or reduce the stubble load through spreading straw, chaff carts, or grazing stubbles.

While this guideline provides recent research findings, the best outcome will depend on a grower's individual situation, including livestock, stubble loading and type, weed, disease and pest pressure, and harvesting and seeding challenges.

BENEFITS AND COSTS

The key differences between retaining stubble high and cutting low are differences in harvest efficiency, nutrient retention, feed value, weed control and seeding efficiency.



Stubble cut at 21cm (left) compared to 12cm (right) Photo: UNFS

Project Information

This management guideline has been developed for the Upper North Farming Systems Group (UNFS) as part of the Maintaining Profitable Farming Systems with Retained Stubble Initiative, funded by the Grains Research and Development Corporation (GRDC).

The Stubble Initiative involves farming systems groups in Victoria, South Australia and southern and central New South Wales, collaborating with research organisations and agribusiness, to address challenges associated with stubble retention.

The GRDC, on behalf of growers and the Australian Government, is investing $17.5 million in the initiative that has been instigated by the GRDC Southern Regional Panel and the four Regional Cropping Solutions Networks that support the panel.

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

Cost vs Benefit

A rough estimate of the benefit of retaining full stubble (60cm) compared to less stubble (15cm), assuming no grazing:

($21/t harvest efficiency x 1.5t/ha)
+ ($2.50/ha nutrient retention) –
($10/ha increase weed control cost)
= $24/ha

Disclaimer: this calculation is theoretical only and makes a range of assumptions. Growers should consider their unique situation when making management decisions on their farm.

BENEFITS OF MORE STUBBLE

Harvest efficiency

In GRDC research, harvesting high (60cm) has been shown to improve harvesting efficiency (hectares per hour) by up to 41 per cent and reduce fuel consumption (litres per hectare) by 78 per cent, saving on average $21 per tonne. An Upper North demonstration in 2015 found cutting at 32cm compared to 12cm improved harvest efficiency in tonnes per hour by 50 per cent while reducing fuel consumption by 10 per cent.

Nutrient retention

Retaining stubble allows the nutrient within the plant residues to be returned to the soil. If stubble is cut but retained in the paddock by cutting and spreading, these nutrients will also be returned, and it is estimated that nutrient losses from grazing sheep are minimal.

The GRDC estimates the cost of lost nutrients from removing chaff is about $2.50/ha in Western Australia.

COSTS OF MORE STUBBLE

Harvest weed control

The costs of weed control for high or low-cut stubble depend on the equipment available to the grower.

Weed seed destruction such as the Harrington Seed Destructor will allow growers to achieve a high level of weed control with full stubbles, while chaff carts will provide almost as many benefits with lower stubble. Based on GRDC estimates, a Harrington Seed Destructor will cost a grower about $25/ha incorporating capital and operating cost, compared to $15/ha for a chaff cart, meaning the ability to retain full stubble costs growers the equivalent of $10/ha for best practice weed control.

There are many other options available for weed control, including narrow windrow burning, which has a low cost but removes more stubble, or other Integrated Weed Management options including chemical and cultural controls.

Seeding efficiency

The difference in seeding efficiency for a high or low stubble load will depend on the grower's equipment. In Upper North conditions, it is expected both tyne and disc seeders, with appropriate configuration, can operate in full stubble without yield losses.
For more information on seeding into stubbles, see the UNFS guideline *Seeding into stubble retained systems*.

SAME BENEFITS AND COSTS

Many of the benefits and costs of stubble retention are either unaffected by the height of stubble or the effect is difficult to quantify.

These include the benefits of reduced erosion, soil biology and soil water preservation, and the risks of pre-emergent herbicide efficacy, diseases and pests.

Consistent benefits

- Erosion can cause significant yield losses. Measurements taken at Port Germein in 2011 showed 35cm of standing stubble can reduce wind speed from 23 km/h to 4 km/h at 20cm above the ground, significantly reducing the potential for erosion. The reduced wind speed also reduces the moisture loss from evaporation.
- Soil carbon plays an important role in nutrient mineralisation. Retaining stubble increases the proportion of carbon that is returned to the soil, improving microbial activity and therefore nutrient availability to crops.
- Stubble retention reduces evaporation losses and allows improved infiltration of summer rainfall. A Charles Sturt University study found stubble can increase the soil moisture at seeding by up to 60 per cent.

Consistent risks

- Stubble can reduce the efficacy of some pre-emergent herbicides. To manage this, growers should choose appropriate herbicides (see UNFS guideline *Seeding into Stubble Retained Systems*), use correct spray application methods including coarse droplets, high pressure and high water-rates, and use a wide range of IWM tools rather than relying heavily on any one weed control measure.
- Stubble retention has both positive and negative influences on soil-borne disease levels. Long-term stubble retention can improve disease suppression of soils and therefore lower risk, but in the short term, stubble can host soil-borne diseases. This can be managed through rotations, variety selection and chemical controls.
- Stubble can act as habitat for both mice and snails. Growers can control these pests through baiting, rolling and good farm hygiene.

NO PROBLEMS

Two areas that are commonly considered as risks for stubble retention are yield losses and nutrient immobilisation. Trials have shown these are not likely to be threats in Upper North conditions.

While GRDC research has found that stubble loads above 3t/ha at sowing (about 4.3t/ha at harvest) can reduce yields in seasons with greater than 250mm rainfall, these conditions are likely to be rare in the Upper North.

Recent trials at Hart have found no differences in yield from stubble retention with or without additional nutrition, indicating it is unlikely Upper North growers would need to use additional nutrition to offset the effect of N tie-up.

Want the best of both worlds?
Read the UNFS guideline *Grazing Stubbles*

Putting it into practice - farmer feedback on stubble height

Andrew Walter, Melrose

Andrew has found that if he harvests between 20 and 30cm, depending on the crop density, his Bourgault Paralink air seeder can sow into the stubble without any problems.

However in 2016 Andrew found when direct heading 200ha of a 2t/ha canola crop that he was harvesting too slow at 30cm, so instead he decided to harvest at 50cm, then went back over with the header at 15cm, chopping and spreading the residue.

His harvest speed went from 1.5km/h at 30cm, to 3km/h at 50cm, then when going back over the stubbles he achieved a speed of 15km/h.

Andrew with his wife Lydia and daughter Elsie.

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