

# Stubble Management Guidelines



## Stubble grazing

### Key facts

- » Crop stubble offers a valuable source of feed for livestock during summer providing careful feed budgeting, monitoring and grazing management is in place.
- » Grazing stubble in a mixed farming enterprise can be an effective way to manage stubble loads and summer weeds.
- » A sound understanding of livestock nutritional requirements and stubble quality and quantity is essential to support both livestock and paddock condition.
- » Monitor feed on offer and livestock condition carefully to determine if and when supplementary feeding or use of a containment area needs to be implemented.



Monitor and manage weeds in stubble paddocks to prevent toxicity issues in livestock. Photo: Hamish Dickson, AgriPartner Consulting

**Grazing crop stubble** presents an opportunity for mixed farming enterprise managers to more closely integrate livestock and cropping systems. When managed well, grazing stubble can provide benefits to and maximise the profit of both cropping and livestock enterprises.

Crop stubble provides a valuable feed resource for livestock and can often allow pastures a rest from grazing during summer and early autumn. Grazing stubble provides an additional stubble management strategy and integrated weed management tool for cropping enterprises.

As with any grazing system careful monitoring and management is required to ensure both livestock and paddock condition are maintained in optimal condition. Poor management can result in a drop in animal condition and productivity, and the loss of ground cover, which can lead to erosion, particularly on light soils.

### Feed value of stubbles

Stubble can provide a significant amount of feed for livestock, however, it is important to fully assess both the quality and quantity of feed available when utilising this resource.

Assessing stubble feed quality involves evaluating the different components of stubble — residual stems, leaf, chaff and grain. Each component varies in terms of its nutritional value for livestock (Table 1). In general, most of the feed value in stubble comes from the residual grain in the paddock following harvest.

### Project information

This *Stubble grazing* 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 UNF00002).

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.



**TABLE 1. Typical range in feed quality of different cereal stubble components**

Component	Metabolisable energy (MJ/kg DM)	Crude protein (%)
Straw	5.5 – 7.5	2.0 – 5.0
Leaf / chaff	6.5 – 9.0	5.0 – 8.5
Grain	12.0 – 13.5	9.0 – 15.0
Green feed / re-growth	9.5 – 11.5	15.0 – 25.0

When evaluating stubble quality, it is important to determine what value it can provide to livestock in terms of energy and protein. Table 2 shows the average and range in nutritional quality of different types of crop stubble (straw-only) and indicates that stubble quality is generally low and below maintenance requirements of livestock if the residual grain portion is unavailable. Nutritional requirements of sheep are outlined on page 4.

Availability of grain in the stubble typically dictates the potential grazing duration more often than the quantity of stem material on offer. Assessing the amount of grain available in the stubble requires counting the number of grains in a sample quadrat for each paddock. Table 3 shows the number of grains required in a 0.1m<sup>2</sup> quadrat to provide 100kg/ha of grain for livestock. This assessment assumes an even distribution of



**Cereal stubble showing stem, chaff and grain components.**  
Photo: Hamish Dickson, AgriPartner Consulting

grain across the paddock. Using a single header row as the only measured area will lead to an inaccurate estimation for the paddock. Randomly assess 10 locations across a paddock and use the average of these results to gain a more reliable assessment of total grain availability.

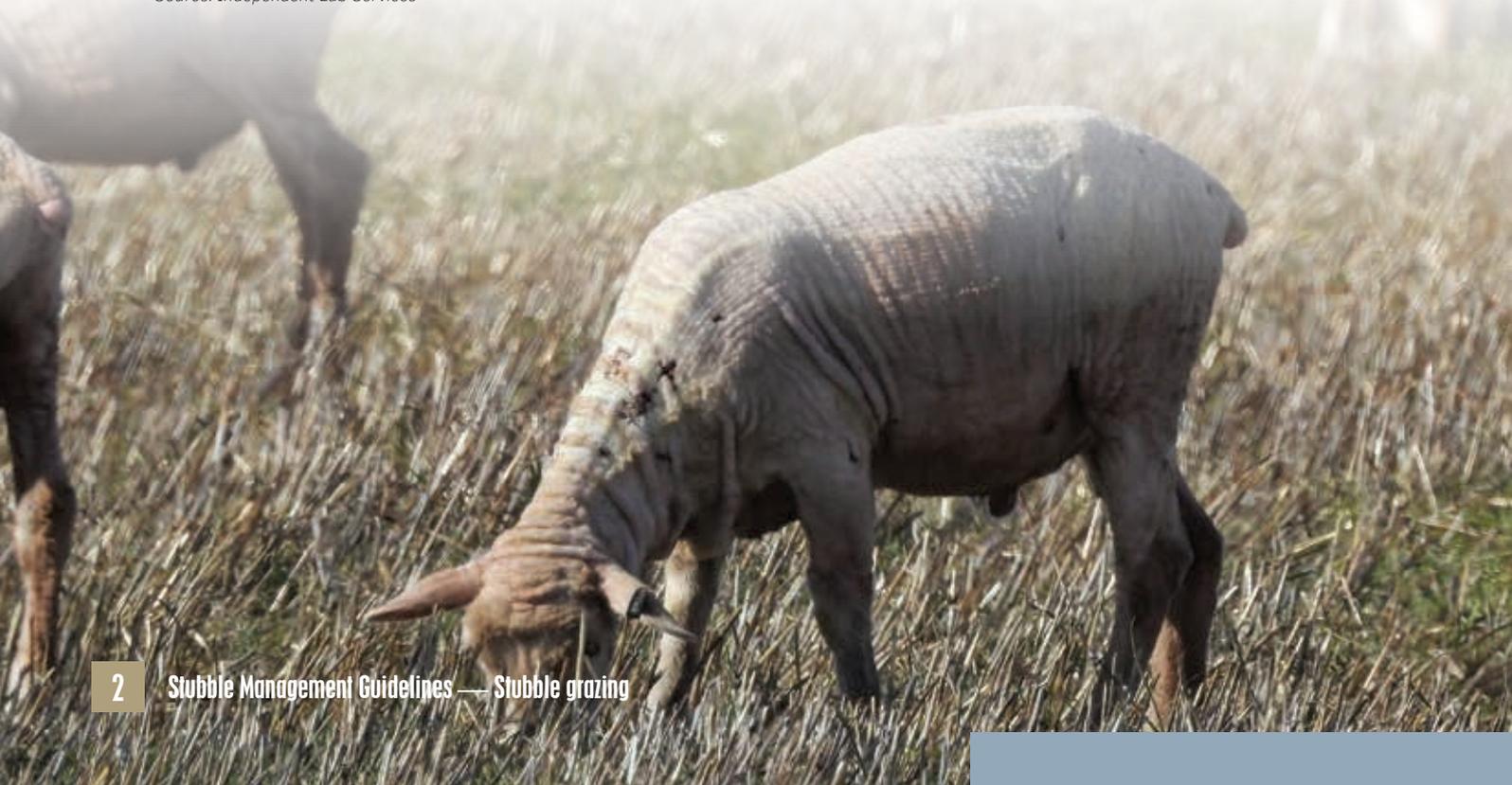
**TABLE 2. Range and average (shown in brackets) in nutritive value of different stubble straw**

Straw/stubble	Dry matter (%)	Metabolisable energy (MJ/kg DM)	Crude protein (%)
Oats	89	6.0 – 7.7 (6.8)	4.0 – 6.5 (5.0)
Barley	89	6.0 – 7.5 (6.7)	4.0 – 6.5 (5.0)
Wheat	91	5.8 – 7.0 (6.5)	2.5 – 6.5 (3.5)
Triticale	89	5.5 – 7.0 (6.3)	2.5 – 6.0 (3.5)
Lupins	92	5.5 – 9.5 (8.0)	6.0 – 10.0 (8.0)
Peas	90	6.5 – 7.8 (7.2)	6.0 – 8.5 (7.5)
Canola	92	5.5 – 7.5 (6.5)	4.0 – 7.5 (6.0)

Source: Independent Lab Services

**TABLE 3. Number of grains per 0.1m<sup>2</sup> quadrat to provide 100kg/ha of grain in stubble**

Grain	Number of grains
Wheat and oats	28
Barley	25
Lupins	8
Field peas	5
Faba beans	2





High stocking rates for short periods of time will optimise feed utilisation when grazing stubble and maintain paddock condition. Photo: Hamish Dickson, AgriPartner Consulting

## Grazing management

Management of livestock grazing stubble is just as important as managing livestock on pastures. Grazing stubble with high stocking rates, for short periods of time, results in the best utilisation of feed resources, and helps to conserve paddock ground cover and condition.

A rotational grazing style of management is preferable to set stocking for longer periods. Set stocking typically results in uneven utilisation of the paddock and overgrazing around water points and camp areas, leading to erosion and soil degradation.

There is a range of methods available to predict the number of grazing days available from stubble paddocks, however as most of the feed value is derived from the grain within the stubble, monitoring of this component should be the driver of when stubble quality has declined and stock should be removed or supplementary fed.

Research from the GRDC's *Grain and Graze* project has shown livestock typically lose weight when less than 40kg/ha of grain is available. Livestock require approximately 0.7kg/day/DSE to maintain condition.



Example of 50 per cent ground cover for cereal stubble. Source: *Stubble Management: A Guide for Mallee Farmers* (2013), Mallee Sustainable Farming Inc

When grain availability has declined to the point it will not meet animal requirements (i.e. less than 40kg/ha), stock should be removed from the paddock, or if ground cover permits, supplementary fed to maintain animal performance.

A minimum of 50 per cent ground cover is required to prevent wind erosion and consider allowing higher amounts of ground cover where stubble is not well anchored, or on particularly light soil types.

The following calculation can be used to determine the number of available grazing days:

STEP		EXAMPLE
1	Determine grain availability	100kg/ha present (60kg/ha available to stock and 40kg/ha unutilised)
2	Assess animal DSE rating	1.3DSE (e.g. 65kg dry ewe)
3	Determine stocking rate	5 ewes per hectare (i.e. 6.5DSE/ha)
4	Calculate grain consumption per hectare	0.7kg x 6.5 = 4.55kg/ha/day
5	Calculate available grazing days	60kg/ha / 4.55kg/ha/day = 13 days



Stubble components (straw, leaf, chaff, grain) can rapidly change in quality and availability depending on grazing management and summer rainfall. Livestock performance will vary with overall quality and availability, so closely monitor animal condition when grazing stubble. Monitor livestock by condition scoring or weighing a sample of 50 animals from the group on a regular (ideally monthly) basis. This will quickly identify any issues and allow for management strategies, such as supplementary feeding, to be implemented before flock performance is affected.

## Supplementary feeding

To assess whether supplementary feeding is required first requires an understanding of the nutritional requirements of the animal.

The primary nutritional requirements of livestock are for energy and protein. Table 4 shows the nutritional requirements of a range of different classes of sheep. Use this information to compare the nutritional quality available from stubble to the requirements of the animal and determine whether supplementary feeding is necessary.

**TABLE 4. Energy and protein requirements of sheep**

Animal type	Metabolisable energy (MJ/day)	Crude protein (%)
Ewes — dry (maintenance)	8.9	8.0
Ewes — late pregnancy (single)	13.7	8.7
Ewes — late pregnancy (twins)	17.4	10.5
Ewes — early lactation (single)	14.9	11.8
Ewes — early lactation (twin)	18.9	15.5
Weaner lambs	15.4	16
Replacement ewe lambs	13.5	14

*Note: Assumes 65kg mature weight of ewes. Requirements will vary depending on the liveweight and target growth rates or condition score of animals*

For further information on animal requirements see [www.makingmorefromsheep.com.au](http://www.makingmorefromsheep.com.au) or <http://mbfp.mla.com.au/> (for cattle information)

Using the earlier example of a 65kg dry ewe (maintenance), the following process can be used to calculate whether the stubble is adequate to meet the energy requirements of the animal, until grain availability declines.

If summer rainfall events generate significant amounts of green feed in stubble, account for this in the diet of livestock. This feed can contribute both energy and protein (Table 1), however its high moisture content can limit the amount consumed.

Mineral supplementation can also be important while grazing stubble. In general, cereal stubbles are deficient in calcium and for this reason a mix of lime and salt (80 per cent lime, 20 per cent salt) is recommended for stock grazing these stubbles to meet calcium demands. Other minerals, such as cobalt, selenium and copper, can also be deficient in stubble, however mineral profiles vary depending on location and season. Seek professional local advice before supplementing with these minerals.

## Other considerations

### Water

Water is the most critical requirement of livestock and both the quality and positioning of water points can affect animal performance and stubble utilisation. Ensure water is clean and readily available so stock do not have to wait at a water trough for access. Water points are ideally located in the middle of the paddock to encourage even grazing, however where this is impractical, troughs can be located on the paddock perimeter and should not be located more than 500m apart.

### Animal health

Grazing stubbles can present several animal health issues. While residual grain provides a valuable feed resource for livestock, it can also present an acidosis risk, particularly for stock not adapted to eating grain. Acidosis occurs when sheep or cattle are rapidly introduced to grain and the rumen has not had adequate time to adapt. Always introduce livestock to grain by gradually increasing the amount available, particularly for high-starch grains, such as barley or wheat. Where large amounts of grain are available in the stubble this may be best achieved by trail feeding stock before introducing them to the stubble paddock.

Some summer weeds, such as heliotrope, can also present a toxicity problem for sheep and cattle. Manage weeds to ensure livestock do not consume large amounts of any toxic plant.

Lupin stubbles can present a risk of lupinosis, which is a liver disease caused by a mycotoxin present in the lupin stalks, mostly commonly occurring after summer rain.

STEP	EXAMPLE
1 Determine animal requirement	8.9 MJ ME/day (from Table 4)
2 Estimate grain intake from stubble	0.7kg/DSE x 1.3DSE rating = 0.9kg/head/day as fed, or 0.8kg/head/day dry matter (DM)*
3 Determine energy content of grain available	Barley = 12.8MJ ME/kg DM
4 Calculate energy intake per day	0.8kg DM x 12.8MJ ME/kg DM = 10.2MJ ME/day
5 Calculate whether supplementation is required	Requirement = 8.9MJ ME/day Stubble supply = 10.2MJ ME/day Balance = +1.3 MJ ME/day No supplementation required

*Rations are typically formulated on a dry matter (DM) basis (i.e. moisture content is removed). For this grain example 0.9kg x 89% DM = 0.8kg on a DM basis.*



## Containment areas

When stubble quality and quantity has declined to the point where stock need to be removed, one option for managing livestock is to place them into a containment area. Containment areas are simply a small area where stock can be contained and are provided their entire diet. These facilities help to prevent overgrazing of stubbles and are also often used to defer grazing of pastures at the break of the season to allow an adequate feed wedge in front of stock.



Containment areas can be used to prevent overgrazing when stubble quality and quantity is insufficient to support the nutritional needs of livestock. Photo: Jim Kuerschner

## Stubble offers complementary feed source

### Don Bottrall, *Heathdon, Appila, SA*

Don Bottrall owns and runs a mixed farming enterprise about 7km south-east of Appila in the Upper North region of South Australia. Crop stubbles provide feed for livestock after pasture paddocks have finished. Don usually complements stubble with supplementary feeds to get sheep, particularly pregnant ewes, through the autumn 'feed gap'.

From 2014–17, PIRSA ran a stubble-grazing trial on Don's property as part of the Upper North Farming Systems' GRDC-funded 'Stubble Initiative'. The trial compared set-stocking with rotational grazing to see if the grazing value of the stubble could be maximised without losing too much ground cover. Ground cover is important to Don for protecting his soils against erosion. It was also thought the greater grazing pressure under rotational grazing might result in more even cover and less areas bared out by stock tracks and camps.

Overall, there were no consistent differences between set-stocking and rotational grazing in ground cover measurements. In the final trial year, grazing intensity was lighter on both treatments compared with other years, and stock tracks were more evident on the set-stocked area than on the rotationally-grazed area. The stubbles on the rotationally grazed areas tended to be more flattened and more evenly distributed whereas the set-stocked stubbles appeared more upright and in clumps after grazing. This was assumed to be due to the greater stocking density in the rotationally-grazed areas.

The trial on Don's property was carried out in a 7ha paddock and he believes that in larger paddocks, there would be more uneven grazing under set-stocking. However, subdividing larger paddocks into smaller ones on a permanent basis to get more intensive grazing would significantly affect cropping activities.



Don Bottrall uses stubble to provide a source of feed when pastures have finished. Photo: Mary-Anne Young

Don found rotationally grazing stubbles probably had more advantages from a stubble management perspective than the feed value of the stubbles. More even trampling and flattening of stubbles makes it easier for machinery to work through at sowing, and flattened stubble is less favourable for snails than upright stubble.

Feed quality was analysed each year before stock went into the trial paddock and the tests consistently showed the stubble had low nutritional value.

Since carrying out the on-farm grazing comparison, Don has introduced supplementary lick feeders to sheep grazing stubbles and has found that by paying attention to flock size and type, and carefully monitoring residue levels in paddocks, he can get good utilisation of crop stubble through grazing.



## Stubble boosts stocking rates

### Jim Kuerschner, Black Rock Ag, Orroroo SA

Jim Kuerschner estimates that grazing stubbles in his family's mixed farming operation increases carrying capacity by 20–30 per cent, as well as utilising a valuable feed resource that would otherwise be wasted and providing an additional stubble management and weed control tool during summer.

Jim and his family operate a mixed cropping and livestock enterprise about 15km south of Orroroo in the Upper North region of South Australia. Their sheep enterprise consists of a 1400 head self-replacing Merino flock, lambing during July–August. Wether lambs are typically finished in an on-farm feedlot. Jim also runs cattle, but runs them on pastures only, and does not use cattle to graze stubbles. About 40 per cent of farm is cropped, providing a large area of stubble, which is utilised by the sheep enterprise following harvest.

To maximise the feed value from stubbles, Jim grazes them with ewes as quickly as possible following harvest. He determines the feed quality available predominantly from the amount of grain on the ground and the presence of any green feed from weeds or volunteer growth.

Jim regularly monitors the proportion of each component of stubble (i.e. straw, chaff and grain) as well as the level of grazing in unarable areas of the paddock, such as creek lines or shrubs. This allows him to assess whether he needs to implement supplementary feeding to ensure sheep maintain condition. When supplementary feeding grain, Jim prefers to use oats as it is a 'safer grain' to feed than barley or wheat.



Jim has been able to increase stocking rates by utilising crop stubble as a valuable feed source. Photos: Hamish Dickson, AgriPartner Consulting

While Jim does not have a set target for factors such as ground cover, to dictate when to destock paddocks, visual monitoring of ground cover, available feed and the amount of dust in the wool of sheep, support his decision as to when to remove stock from stubble paddocks.

Several years ago the Kuerschners built a multi-purpose feedlot for finishing lambs and containing ewes when stubbles or pastures need to be destocked. The containment area is often also used at the break of the season to defer grazing pastures and develop a feed wedge in front of stock.

Overall, Jim sees grazing stubbles as a valuable way to integrate cropping and livestock enterprises. Grazing can assist the control summer weeds and stubble breakdown before sowing the following season.





## Grazing stubble optimises integration

### Matthew Nottle, Lambruk and Gillawarra, Booleroo Centre SA

Matthew Nottle believes grazing stubble is a great way to integrate his cropping and livestock enterprises. Stubble provides a valuable feed resource for sheep throughout summer and autumn when pastures require rest, while livestock assist the cropping enterprise by reducing crop residue for sowing, providing some control of summer weeds, and assisting with mice and snail control.

Matthew and his family operate a mixed cropping and livestock enterprise east of Booleroo Centre in the Upper North region of South Australia.

Their livestock enterprise comprises a self-replacing Merino flock of 370 ewes, plus a further 130 Merino ewes joined to a white Suffolk terminal sire for first-cross lamb production. Lambing occurs during June–July, with weaning taking place around harvest time for lambs to go onto the best stubbles. The Nottles' cropping enterprise typically start their cropping rotation with wheat then barley, followed by a break crop or pasture. More than 90 per cent of the property is cropped, providing 1200ha of stubble for grazing.

As soon as harvest is underway, sheep start grazing stubble. Crossbred and Merino lambs preferentially graze the higher-quality legume stubbles, such as peas or vetch. Hoggets followed by mature ewes graze the lower-quality cereal stubbles, which better suit the nutritional demands of these classes of stock.

Matthew condition scores livestock and closely monitors their grazing behaviour to help determine when supplementation is



Utilising crop stubble as a feed source is just one way Matthew Nottle integrates his livestock and cropping operations. Photos: Hamish Dickson, AgriPartner Consulting

required. He has been using lick feeders to provide grain to stock grazing stubbles for many years and finds they minimise the wastage and contamination that can occur when trail feeding. Lick feeders also reduce the labour cost of feeding grain and provide better control over the amount of grain fed compared with trail feeding grain.



# Legume stubbles boost bottom line

## Lachlan Smart, Avonmore, Wirrabara SA

Legume stubbles used to finish crossbred lambs have delivered a profit of \$400/ha on top of the cropping margin, while cereal stubbles provide a place for stock to go during summer, giving pastures a well-earned rest on Lachlan Smart's mixed farming enterprise about 8km west of Wirrabara in the Upper North region of South Australia.

Lachlan's livestock enterprise comprises a self-replacing Merino flock of 1200 ewes, plus a further 600 Merino ewes joined to a terminal sire for first-cross lamb production. Ewes lamb during May and June.

'Avonmore' has 600ha of arable land with an additional 1000ha of unarable hill country. The cropping enterprise is largely driven by the needs of the livestock enterprise, in that it provides sown pastures and grain to feed sheep. The arable land is sown to about 200ha of pasture, 200ha of legume/pulse crops and 200ha of cereal crops.

Lachlan starts grazing stubbles as soon as harvest is underway and calculates the amount of residual grain in stubble to assess the quality available. He uses a minimum threshold of 30 grains per 0.1 m<sup>2</sup> to determine whether supplementary feeding is required.

Most commonly Lachlan supplements with either barley and lupins, or lupins on their own, and he liaises with his consultant to determine suitable supplementation rates. Lachlan does not feed hay to stock grazing stubbles, however during recent years he has started providing lime and salt to help manage calcium nutrition.



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Crop stubble offers multiple livestock benefits in Lachlan smart's mixed farming operation. Photos: Hamish Dickson, AgriPartner Consulting

### Grazing management

Lachlan has moved away from traditional set stocking and towards a high-density rotational grazing strategy. This has not only assisted in better utilisation of stubbles, but also provided improved weed management for the cropping program, typically saving one chemical application per year.

Overall, Lachlan sees grazing stubbles as a great way to integrate his livestock and cropping enterprises. Grazing can assist the control of summer weeds and breaks down stubbles for sowing the following season.

### References and further information

- » GRDC's Grain and Graze website. [Click](#)
- » Stock containment areas — More than a drought measure, Government of South Australia and Natural Resources, Adelaide and Mt Lofty Ranges. [Click](#)

### Acknowledgements

This guideline was prepared by Hamish Dickson — AgriPartner Consulting. Don Bottrall's case study was prepared by Mary-Anne Young — PIRSA Rural Solutions.