

Keeping livestock productive on crop stubbles

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RESEARCH



Key messages

- **Feed value will vary across a paddock and is difficult to measure.**
- **Feed quality is determined by the amount of residual grain and green plant growth.**
- **A guide for a productive stubble is one with at least 40 kg/ha of grain or green shoots, but condition scoring or weighing animals is most accurate.**

Why do the trial?

Crop stubbles are an important feed source for livestock over the summer/autumn months in mixed farming enterprises. They are available when green pasture is scarce and are used to reduce high stubble loads for better establishment of subsequent crops.

Numerous studies across Australia have shown that lightly grazing stubbles will not compromise a cropping system, with no negative impacts to soil health or subsequent crop yields, so long as sufficient stubble (50-70% ground cover) is retained to prevent wind erosion and maintain water infiltration.

How was it done?

The GRDC-funded 'Grain & Graze 3' program included a project monitoring cereal and pulse stubbles across south east Australia, including at Minnipa, and measured the feed quality of a range of crops.

What is the grazing value of stubble?

Stubble quality can vary between crops and seasons and can change quickly across a paddock, particularly once grazing commences or after summer rain. The value of feed is determined by the amount of residual grain and green plant growth present, including summer weeds and shot grain. The efficiency of modern harvesting methods and better weed control means there is now less grain and fewer weeds left in stubbles than 25 years ago.

Digestibility is the main factor that determines feed intake and the energy of that feed. Sheep and cattle will eat the most digestible feed first (grain and green) and leave the least digestible (straw) until last. Grains such as barley or lupins are 80-90% digestible and provide a high energy diet, whereas straw and trash have generally lower digestibility (35-55%) and provide less energy.

Protein is also very important with higher requirements during late pregnancy and lactation, and is necessary for good liveweight and wool growth rates. Cereal grains generally contain between 8-15% protein, and legume grains 20-36% protein. However, straw contains less than 5% protein which is too low to sustain sufficient microbial growth in the rumen and may restrict fibre digestion, so an

additional source of protein is generally needed.

A feed test will accurately measure the nutrient level of your grain and stubble components. Research carried out as part of the Grain & Graze initiative measured the feed quality of a range of crops across south eastern Australia to determine the average value of crop components (Table 1).

Using feed tests, you can deduce whether stock are getting the nutrients they need according to their respective class (Table 2).

What happened?

Estimating feed value

Monitoring of stock and the paddock condition will prevent a setback in production, which takes time and resources to recover. However, the feed value of stubbles is variable and can be difficult to measure accurately. Recording liveweight and condition score will give you the best measure of livestock wellbeing, where stock must be maintaining or increasing weight. The logistics of collecting liveweight is currently labour intensive for most people, particularly on extensive properties, but innovations are developing such as walk-over-weighing and the use of GPS tracking technology to monitor livestock behaviour which could indicate a change in weight and available feed.

Livestock may begin to lose weight on a stubble paddock by, if not before, six weeks of grazing, depending on type of stubble, season, paddock size and the stocking pressure (number and class of animal).

Table 1 Average feed value of crop components

Feed Value	Wheat & Barley stubble				Oats	Lentils	
	Grain	Green	Straw	Loose trash	Grain	Grain	Straw
Digestibility DMD (%DM)	82-87	59-73	38-40	40-41		92	36
Metabolisable energy (MJ/kg DM)	12.7-13.2	8.5-11.0	5.0-5.3	5.3	9.0-11.0	13.1	4.6
Crude protein (%)	9.5-13.5	15.9-18.7	1.2-2.8	2.0-4.0	6.0-12.0	27.5	6.7

Source: Grain & Graze, (2004-2007, 2016)

Table 2 Nutrient requirements of different sheep classes

	Maintenance of 70 kg dry ewe	Lactating 70 kg ewe		40 kg weaner lamb	
		# of lambs		Growth rate	
		Single	Twin	250 g/day	300 g/day
Daily DM intake (% of liveweight)	1.9	2.8	2.8	3.3	3.8
Feed intake (kg/animal/day)	1.3	2	2	1.3	1.5
Metabolisable energy (MJ/day)	10.3	15.7	19.8	10.6	12.3
Protein (g/day)	104	229	306	171	199

Source: Adapted from NRC (2007)

Previous Grain & Graze research in southern Victoria found that cattle lost weight once the grain or green shoots available fell below 40 kg/ha of grain, or 40 kg/ha of green shoots (shot grain and weeds)¹.

To estimate the quantity of useful feed, count the number of grains and green shoots in a 0.1 m² (32 cm x 32 cm square) quadrat. The approximate calculation for grains is to multiply this number by a factor of 3.2 to get the quantity of grain in kg/ha (e.g. 26 grains/m² equates to 83 kg/ha) and similarly for green shoots, multiply this number by a factor of 2.9 to get the quantity of dry matter in kg/ha (e.g. 21 shoots/m² equates to 61 kg/ha).

At Minnipa, a barley, wheat and canola stubble were sampled prior to grazing then regularly over a four-month period. Table 3 shows the quantity and quality measurements of whole stubble samples from the first monitoring on 14 December immediately after harvest. It shows what influence the low quality straw and trash has on overall nutrition. The value of the grain fell within the ranges presented in Table 2, with much higher digestibility, protein and energy. The feed value of the stubbles after 14 December fluctuated, however a common

outcome for all stubble types was that quality deteriorated rapidly following summer rainfall. Stubble quantity remained high throughout the sampling period due to low stocking rate and conservative grazing practices.

How does weather affect the feed value of my stubble?

Rain during summer and autumn can reduce the digestibility of the stubble, mainly through leaching out the soluble/digestible components of the straw. Over 55 mm of rain in early January 2016 on a barley stubble at Birchip reduced digestibility from 47.5 to 32.6%, and ME from 6.6 to 4.2 MJ/kg of DM. However more importantly, germination of grain and weeds after rain can create very useful feed. For the same barley stubble, while grain on the surface had been eaten, buried grain germinated and provided 70 kg green shoots/ha, which are highly digestible and have high energy value (>11 MJ ME/kg DM) and protein (>25% protein).

Stubbles following a drought, that have hayed off or suffered frost or heat damage, often contain more nutrients than usual. If a crop dies quickly after flowering, less energy and protein can be deposited into grain, so it remains in the stem and leaves, providing more nutrition.

Stubbles after a good season can vary in feed value depending on weather events. If harvest is uneventful weatherwise, crops have less feed value as tall heads are efficiently harvested and less grain is left in the paddock. Stock will quickly graze off any grain in the crop stubble before moving to fence lines searching for other weed seeds. On the other hand, spring rains can induce late tillers that are lower in height and not collected by harvest that will contain feed value. Crops, particularly high yielding crops, may also suffer from windy weather from lodging, cereal head loss or loss of grains such as faba beans, dropping grain to the ground that cannot be picked up at harvest. Take note at harvest to get an indication of how weather has affected the value of your stubbles.

Managing grazing behaviour on stubbles

Grazing behaviour on stubbles can be different to that on green feed and depend on the animals. For example, lambs can be hesitant to graze tall stubbles and will circulate the paddock due to inexperience, whereas ewes may want to graze with heads facing into the breeze, or hang around scrub lines, hills and troughs in warmer weather.

Table 3 Quantity and quality of stubble feed components sampled at Minnipa on 14 December 2015 prior to grazing over 2015/16 summer

Stubble type	Quantity					Feed quality of whole stubble sample			
	Trash (t/ha)	Straw (t/ha)	Grain (kg/ha)	Shoots (kg/ha)	Ground cover (%)	Dry matter (%)	Crude protein (%DM)	Digestibility DMD (%DM)	Metabolisable energy (MJ/kg DM)
Barley	1.4	2.4	65.4	7.4	82.2	89.2	2.2	47.5	6.6
Wheat	2.8	1.6	149.5	4.6	78.3	88.3	2.6	41.0	5.4
Canola	1.8	1.8	11.8	22.9	77.8	89.5	2.7	28.3	4.1

To encourage more even grazing, place water points in central locations as best you can. To reduce selective grazing, trampling and camping, use temporary fencing to create smaller grazing areas, to control stocking pressure and protect erosion-prone areas.

What does this mean?

When should stock be supplemented or put into containment?

Knowing when to move animals from a paddock will depend on ground cover and animal condition. When stubbles are grazed in summer, ewes need to be about condition score 3 for joining, and lambs will be about six months old. It's commonly thought that older sheep will use low quality feed more efficiently than young lambs, but this is not the case – it's because dry, older sheep will have seven to eight times more body fat (energy reserves) than young sheep. A 25 kg weaner has only one kilogram of body fat as an energy store, and can survive less than 10 days on this energy.

Unless sheep are bare shorn, there are no shortcuts to monitoring animal condition. It is best to either condition score sheep or weigh them to accurately know whether they are getting enough nutrition and achieving adequate growth rates.

It is recommended that a minimum of 50-70% ground cover (about 1-1.5 tonne dry matter/ha) remains on paddocks to prevent wind erosion. Note that over time it may appear that groundcover is increasing, as sheep knock the standing stubble down as they graze. However, it's preferable to

have some standing stubble, with research indicating that standing, anchored stubble 10 cm high is twice as effective at reducing wind erosion compared with loose flat stubble.

When cover in a paddock is reduced below 50% and the paddock is exposed to winds of 30 km/h or more, loosened soil starts to move. To reduce the likelihood of overgrazing, decisions should be made early to either sell stock, hold stock on less erosion-prone paddocks, or place stock into containment.

What are my other options for grazing stubbles?

Grazing chaff heaps: The chaff fraction from a crop harvest is collected by a chaff cart and heaped to concentrate resistant weed seeds. These heaps have been burnt in the past, but now some growers are grazing them first, and may not burn at all. There is mounting evidence that sheep grazing chaff heaps are performing better than those who are not, achieving better growth rates and lifting lambing percentages. Sheep help to knock down the heaps making the next sowing pass easier, and if burnt they burn faster which avoids having smouldering heaps for days. Barley chaff heaps may thatch and may need burning, preferably in winter to avoid the risk of a fire spreading. In terms of viability, research has shown that less than 3% of ryegrass seeds survive the rumen, whereas up to 30% of ryegrass seeds ingested by cattle remain viable in faeces².

Summer pastures: May include pastures such as lucerne and forage brassicas, or native grasses. These will be sown in spring if

there's stored soil moisture.

Lick and stock feeders: Provide a small supplement of grain. If energy is lacking, open the lick feeder up or use a normal feeder so that stock can get the ration needed.

Trailing-out grain: A cheap and effective way of delivering a grain supplement. Can be along the ground, on old tin, or in a raised feeding system made from tin or shade cloth, that allows water to drain in the event of summer storms.

Grazing ripe standing crops such as oats: A crop that is left to mature and then grazed, saving the harvest, storage and feeding-out costs of grain.

Containment or feedlot: Removal of sheep from the paddock to a smaller holding area, designed and managed for either animal maintenance or finishing.

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