

HAY AND SILAGE FACT SHEET



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Photo: Felicity Pritchard

Making the most of a failed winter crop

Winter crops that fail due to drought, frost, poor pod set or low grain yield potential can be cut as silage or hay. With correct management, a failed grain crop can be salvaged as quality forage

Introduction

Failed crops can be cut for hay or silage to cover some costs of growing the crop and in some instances can be profitable, but markets can be volatile. Crop hay and silage can be of very good quality if managed correctly.

Crops cut for hay can be at risk of weather damage due to longer curing times. Crops cut for silage have less curing time (24 to 48 hours), reducing exposure to possible weather damage.

Silage is cut at an earlier growth stage, making it of higher quality than hay, but is less cost-effective to transport long distances.

Markets for hay and silage

In droughts, fodder can be in high demand. Growers should have a market for hay before cutting their crop, unless the forage is intended for their own stock. Most hay is sold on nutritional specifications. If sold on contracts, growers need to thoroughly understand hay contracts in terms of agreed quality.

The main consideration for hay buyers is cost per megajoule of digestible energy (MJ). Some hay produced from failed crops can be of excellent quality but there can be variability and testing is important before feeding to livestock.

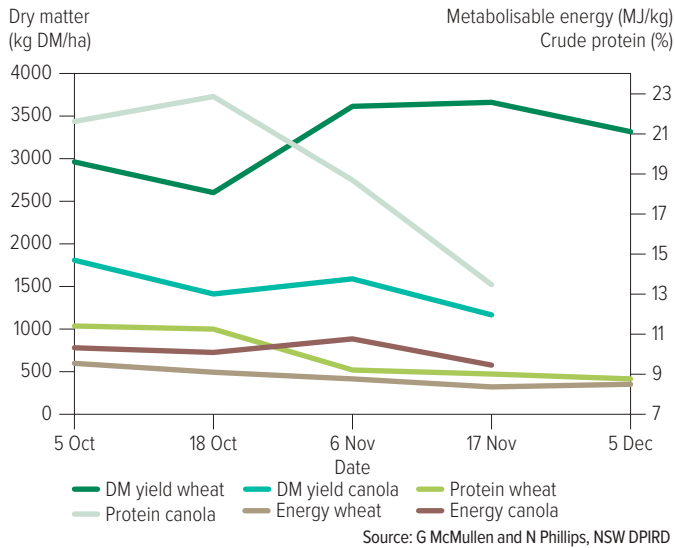


A failed canola crop may be salvaged as hay or silage, but good management is essential to produce a quality product.

Key points

- Hay and silage can be made from failed crops as an alternative income source and is sometimes a profitable venture
- The quality of canola and cereal hay and silage can vary enormously; quality testing is suggested before feeding to livestock
- Before cutting, chemical withholding periods must have expired
- Hay cut at late flowering and conditioned provides a reasonable balance between yield and feed quality
- Markets for hay can be unstable
- Hay and silage can be fed to all types of ruminant livestock as long as precautions are taken when introduced to their diet
- Salvaging calculators can assist growers with failed crops

Figure 1: Whole plant yield and quality of 2006 drought-affected crops.



Source: G McMullen and N Phillips, NSW DPIRD

ESTIMATING HAY YIELD

To estimate hay yield the following method can be applied.

STEP 1: Cut one metre of crop row from five representative sites across the paddock. Cut at the same height the crop will be mowed.

Area cut in square metres = number of rows sampled (five) x row spacing in metres.

STEP 2: Record the fresh weight in kilograms.

STEP 3: To calculate dry matter percentage cut the sample into pieces roughly a centimetre long, to aid drying. Weigh a subsample of 100 to 500 grams and dry.

To dry in a microwave oven, refer to the 'Guide to dry matter testing of silage' listed under Useful resources. Dry matter percentage = dry weight ÷ subsample fresh weight x 100.

STEP 4: The hay yield can now be calculated. However, about 20 per cent of hay can be lost in baling (Figure 1). Hay is typically 12 to 15 per cent moisture.

Assuming 15 per cent moisture and 20 per cent baling loss:

Hay yield in tonnes per hectare = dry matter percentage (step 3) x fresh weight (step 2) x 1.15 x 0.8 x 0.1 ÷ area cut (step 1).

NOTE: The 1.15 assumes 15 per cent moisture; replace with 1.12 for 12 per cent moisture. The constant 0.8 assumes 20 per cent baling loss. This is 100 minus the percentage baling loss, divided by 100. For example, if you expect 30 per cent loss, replace 0.8 with 0.7. The 0.1 converts the yield into tonnes per hectare.

Example:

Five lots of one-metre samples are taken with a row spacing of 25 centimetres (0.25 metres).

The fresh weight was 3.26 kilograms.

The area sampled is: 5 x 0.25 metre rows = 1.25 square metres.

A 400-gram subsample is dried in a microwave and weighs 44 grams.

The dry matter percentage is: 44 grams ÷ 400 grams x 100 = 11 per cent.

The yield of hay at 15 per cent moisture and 20 per cent baling loss is: (11 per cent dry matter x 3.26 kilograms x 0.115 x 0.8) ÷ 1.25 square metres = 2.64 tonnes per hectare.

To cut or not?

The decision to cut a crop must be made early and will be a compromise between yield and quality.

To determine if a crop should be cut, harvested or left standing in the paddock, it is first necessary to estimate grain and hay or silage yields.

An informed decision can be made by estimating commodity prices, costs of harvesting versus hay or silage-making and understanding the market.

Decision support software is available to help with these calculations including the NSW Department of Primary Industries and Regional Development (NSW DPIRD) [Salvaging crops for fodder, grain or grazing – costs and income calculator](http://dpi.nsw.gov.au) available at dpi.nsw.gov.au.

Raking and baling losses are highest in very dry hay: working at night after dew reduces losses in such crops. A greater proportion of biomass is lost in baling crops with less than two tonnes per hectare of dry matter (Figure 2). The quality is also lower as the leaves and pods are lost first.

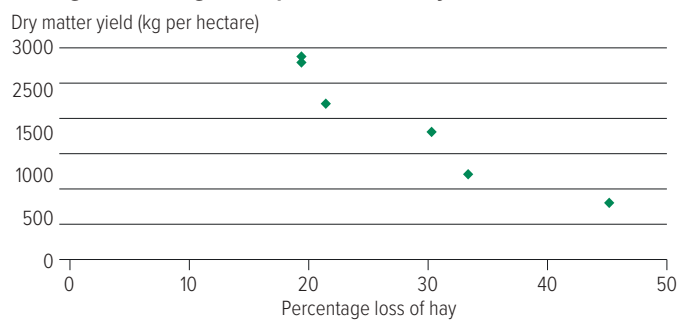
Before cutting a failed crop for hay or silage, the withholding period (WHP) and approval for use on forage crops must be checked on the labels of all chemicals used on the crop.

All WHPs must have expired before cutting. Growers also need to ensure the crop has not been sprayed with a chemical product that carries a label warning or prohibitive statement that treated crops are not to be grazed or fed to livestock.

Failing to comply with a WHP can lead to unacceptable chemical residues in products such as milk, meat and eggs.

Producers can check any chemical listed on the vendor declarations to assess their residue risk exposure (see 'Useful resources' on page 4).

Figure 2: A higher proportion of canola hay is lost during raking and baling in crops with less dry matter.



Source: Nigel Phillips, NSW DPIRD

Left to right: mid-flowering, late flowering and mid pod-fill. As per cereal crops, cutting canola at the later flowering stage is important for the production of quality forage.



Photos: Felicity Pritchard, PACE, and Chris Smith, Longerenong College

Source: Canola at Better Oilseeds Longerenong trial site

Hay and silage should be introduced slowly, replacing part of the ration.



Photo: Emma Leonard

Optimising yield and quality

CROP NUTRITION

The nutrition of the crop will affect the hay and silage quality. Adequate nitrogen will lead to higher protein levels than deficient crops. **However, stressed crops with high soil nitrogen levels are at higher risk of causing nitrate poisoning in livestock if precautions are not taken.**

WHEN TO CUT CROPS FOR HAY OR SILAGE

Late flowering generally represents the peak dry matter yield for canola crops (Figure 1). Yields for cereals may increase after flowering as grain fill commences, but only if conditions for growth persist. Quality largely declines for most species after flowering. The shorter curing time of silage may allow crops to be cut earlier with a reduced risk of weather damage compared with hay.

HEIGHT OF CUTTING

Canola hay has a thicker stem than many other hay crops, which may affect the palatability. Cutting the crop higher – for example, at 15 to 20cm rather than 5cm – improves its quality, as there will be less thick stems. However, hay yields will be reduced.

CONDITIONING

Conditioning of hay improves its quality in three ways.

- Curing time is reduced as conditioning cracks the stem, allowing moisture to escape more rapidly.
- Reducing the period from cutting to baling means less dry matter is lost, particularly the high-quality leaves and pods.
- Cracking of canola stems makes them more palatable and easily chewed by livestock.

HANDLING

Drought-affected crops are often high in sugar and water-soluble carbohydrates, which can increase curing times and may increase the risk of haystack fires. Like all hays, getting moisture down is important for quality and to avoid fire risks. When making silage, it may be desirable to bale and transport the canola to the storage site before wrapping to avoid damage to the plastic wrap. Wrap canola silage with at least four layers of 'netwrap' for less chance of puncture. Monitor the wrap for signs of deterioration.

Buying and using hay

The quality of hay depends on a range of factors, so undertaking a feed test will provide an accurate analysis to help determine feed rations. Drought-affected crops can also be tested for nitrate to avoid nitrate poisoning.

Silage generally produces better-quality feed than hay. The feed quality of canola hay and silage is generally adequate in maintenance rations for sheep and cattle in drought years.

SAFELY FEEDING HAY AND SILAGE

Hay or silage can be fed to all types of ruminant livestock, provided necessary precautions are taken when introducing these feeds to the diet. Animals generally find canola hay and silage palatable and waste very little, but can take one or two days to become accustomed to the taste. Feeding hay and silage is safer than grazing a standing crop because animals will selectively graze plant parts with a potentially higher concentration of nitrates. Hay and silage have caused very few problems – especially considering the large quantities of canola hay and silage consumed over recent years. However, farmers must exercise care at all times to minimise risks to stock health.

MANAGING ANIMAL HEALTH ISSUES

Most potential health issues can be overcome by using the following guidelines to introduce a new feed into the animals' diet.

- Test the nitrate level in hay or silage. The level at which nitrate causes toxicity in ruminants depends on several factors. Generally, hay or silage with less than 5000 parts per million (ppm) nitrate on a dry matter basis is safe; 5000 to 10,000ppm is potentially toxic when provided as the only feed. Forage above 10,000ppm nitrate is considered dangerous but can often be fed safely if diluted with other feedstuffs and supplemented with energy. Stock can sometimes gradually adapt to feed with raised nitrate levels.
 - Never offer large amounts of hay or silage to hungry stock. Introduce it slowly by replacing part of the diet and increase the proportion of hay over several days.
 - Introduce the feed to only a few animals, as described above, monitoring them closely for several days before introducing the canola hay or silage to the other animals.
 - Never feed livestock 'silage' before complete fermentation as it can lead to nitrate poisoning.
- Other considerations to avoid health complications:
- Condition canola hay aggressively to remove any sharp stalk ends.
 - Livestock will consume hay with thicker stems more readily if it is chopped. The length of the fibre can affect the digestibility of hay for ruminants. Feed mixer wagons that chop the straw into consistent lengths are considered to improve the nutrient availability to the animal through better presentation and consistency in the ration.

MILK AND MEAT QUALITY

No reports have occurred of tainted milk from cows or tainted meat of lot-fed lambs fed canola hay or silage. This is possibly due to low levels of glucosinolates in canola.

Vendor declarations

Livestock producers should request vendor declarations from forage suppliers to ensure chemicals are used appropriately and the stockfeed is suitable for stock consumption.

Vendor declarations include:

- 'Commodity vendor declarations', used for primary feeds such as grain. Available from the Meat and Livestock Australia website (see Useful resources); and
- 'Fodder vendor declarations', used for hay and silage. Available from the Australian Fodder Industry Association (AFIA) website (see 'Useful resources' on page 4).

Rotational impacts of hay cutting

NUTRIENT EXPORT FROM A HAY CROP

Nutrient export in hay and silage crops can be very high and needs to be considered when planning the following crop. A soil test in autumn is essential in paddocks where crops were cut for hay or silage the previous season. Growers need to ensure potassium and sulfur levels are adequate.

WEEDS

Hay production is beneficial in reducing the weed seed bank and useful for managing herbicide-resistant weeds. However, movement of hay poses a risk of weeds spreading into new areas. Hay buyers should:

- aim to source local hay;
- ask for written certification on any potential weed content;
- feed stock in a confined area;
- record details of purchased hay;
- monitor feeding areas for up to two years for unfamiliar plants; and
- purchase silage cut early in the season, which will reduce the chance of introducing new weeds.

Hay trucks should be cleaned in a designated area after deliveries.

Recording of decisions and review

Similar events may occur in the future so record all crop measurements, yields, costs, feed quality and livestock outcomes as a future resource. Review this information at a later stage to determine what additional information could have been sourced to improve the decisions made.

USEFUL RESOURCES

Calculators

- NSW Department of Primary Industries and Regional Development (NSW DPIRD): [Salvaging crops calculator](#)
- Agriculture Victoria: [Hay versus grain calculator](#)

Feed testing

- AFIA: [Guide to dry matter testing of silage](#)
- Victoria: [Feeding Livestock](#)
- NSW: [Feed Quality Service](#)

GRDC resources

- Podcast: [Nutrient loss from hay cutting](#), with Rob Norton (2020)
- Video: [Essential plant macronutrients potassium and sulfur leave farms in grain and hay so need monitoring](#) (2020)
- Media release: [Plan for nutrient removal impact when making hay cutting decisions](#) (2020)
- Update Paper: [Hay – does it stack up?](#) (2016)
- GroundCover™: [Hay enterprise underpins crop expansion](#) (2021)

Resources

- NSW DPIRD: [Silage and hay resources](#)
- AFIA: [Fodder vendor declaration form](#)
- Australian Exporters Company: [Producing quality oat hay booklet](#)

FREQUENTLY ASKED QUESTIONS

How do I decide what to do with a failed crop?

Some state government departments have internet-based calculators to help you decide what to do with a failed crop (see 'Useful resources'). You will need to estimate your likely grain yield and hay yield and know the prices of the respective products. If you delay making decisions and cut the crop for hay when it is mature, the hay quality will be low.

Who will buy crop forage?

Crop hay and silage can be fed to all ruminant livestock. Growers should ensure they have a market for hay or silage before cutting their crop, unless they intend to feed it to their own stock.

Is crop hay and silage good quality?

Crop hay and silage can be very good quality if cut by late flowering at a height that minimises hard woody stem content and conditioned. Levels of protein, energy and digestibility can be high, but testing the feed quality is important.

Is canola hay and silage dangerous for animals?

Health problems in animals can occur with all types of feed if precautions are not taken. Health problems from canola hay or silage are uncommon. Nearly all of these have occurred when hungry stock were given unlimited access to canola hay or silage.

Content contributors: NSW DPIRD

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